EXPANSION PLANNING FOR A FISH MEAL INDUSTRY IN ECUADOR

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EXPANSION PLANNING FOR A FISH MEAL INDUSTRY IN ECUADOR

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CHAPTER I

INTRODUCTION

1.1 Background

It is often considered to be a waste of valuable raw material if fish are converted into meal to be fed to chickens and pigs instead of being used for human consumption. This is not true, however, as there are many species of fish which are not suitable for human consumption, but which provide needed protein in animal diets at a cost which is competitive with other protein sources.

Another important aspect in connection with fish meal processing is that when fish are caught for human consumption both trash fish and fish waste are obtained which can be used as raw material for fish meal production.

Based on these important facts, the following is quoted from an interim report on the FAO Technical Conference on Fishery Products held in Tokyo, December, 1973.[1]

> Participants showed a great deal of interest in the Session dealing with protein, fish meal and fish oil. The Conference concluded that where fish cannot be gainfully used for direct human consumption, it should be converted into meal and oil thereby making constructive use of resources which would otherwise be neglected or underexploited or perhaps not fished at all. In the discussion of this topic it was pointed out that fish meal and oil made valuable contributions to human well-being through use for animal feed and for medical and industrial purposes. Another favorable factor was that the fish meal industry frequently plays an

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[1] S. Christensen, "Fish Meal Production," United Nations Industrial Development Organization (June, 1974).

important part in bringing about development of fishery industry, especially in developing countries.

Among the many countries that produce and export fish meal and oil, Peru has been a dominant force since 1956. This South American country has had the most spectacular growth in the production and export of fish meal which is manufactured from anchovy. In ten years, from 1956 to 1965, fish meal output increased at a compound rate of 42% a year, while export earnings multiplied by a factor of 111. The gross value of the industry's production amounted to only 0.1% of the real gross national product in 1955, but ten years later was the equivalent of 4.3% of the GNP. Peru's ability to supply a large fraction of the growing demand for high-protein animal feed enabled it to leap from twentieth to first place among the fishing nations of the world by landing 8.9 million tons of raw fish in 1964.[2]

Peruvian fish meal and fish oil which are manufactured from anchovy have been recognized around the world as an excellent product. However, the tremendous annual production has decreased since 1972. The reduction has been due in part to political turmoil, shifts in the Humbolt Current, and fishing practices of foreign nations in Peruvian waters. Nonetheless, Peru maintains supremacy in the fish meal industry with production of around 900,000 metric tons of meal per year down from 2 million tons produced during the period 1971-1972.

1.2 Purpose

The objective of this research is to develop a technique that

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[2]Michael Roemer, Fishing for Growth: Export-Led Development in Peru, 1950-1967 (Cambridge: Harvard University Press), p. 61.

can be used to plan expansion needs and opportunities in the fish meal industry. The work will focus on a particular fish meal company, Industria Pesquera Jambeli, situated on the coast of Ecuador, South America. Jambeli, known before as Hidromecanica Naval Posorja, started its operations in 1976. The company was bought during 1975 and has been operating since then under new management. This thesis will focus on capacity expansion for the company in order to meet the projected demand for fish meal and fish oil over a period of ten years.

Capacity expansion plans will be developed for production growth rates of 10% and 15% over a ten-year period. Incremental production units will be identified and the proper timing of the acquisition of these units will then be determined. For each plan, a financial analysis will be conducted to evaluate the resulting profitability to the firm.

1.3 The Role of Fish in Meeting the World's Food Needs[3]

There are many protein sources from which man can satisfy his nutritional needs. Many countries have already turned to the sea to obtain their protein foods, and intensified fishing efforts worldwide have depleted many conventional species.

The world population has increased considerably during the last hundred years as shown in Figure 1-1. Atlas/Stord experts have estimated that this increment will continue in gigantic steps. By the year 2000 the total population is estimated to reach a figure two times

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[3]Adapted from "The Role of Fish in Meeting the World's Food Needs" Marine Fisheries Review (Vol. 38, No. 6, June, 1976).

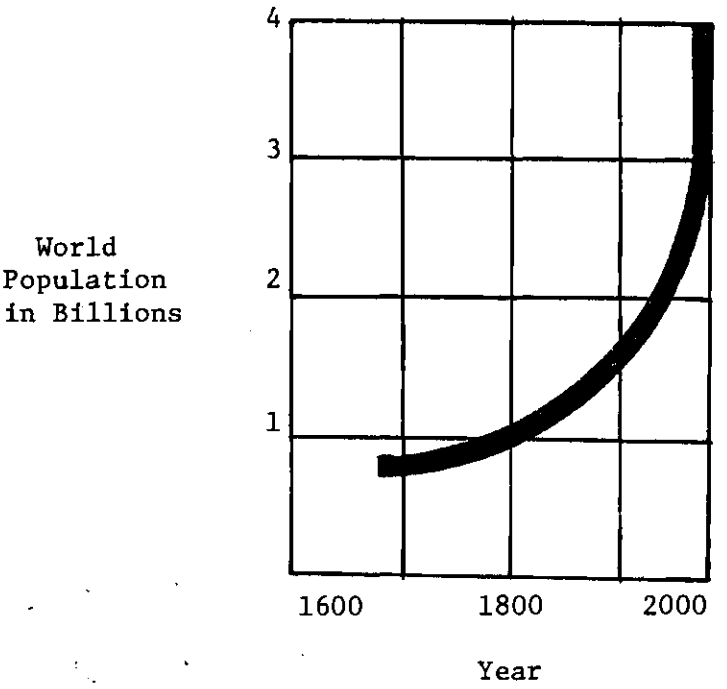

Figure 1-1. World Population

greater than what is was in the year 1960.[4] This continuous increment in the world population has brought an intensification in the fishing industry in an effort to supply the necessary amount of proteins needed for the proper daily alimentation.

Fish meal is obtained from two fishing sources. First, part of the production comes from those fish obtained during primary fishing (i.e., fishing for the purpose of the manufacture of fish meal). This is the case with the anchovy which are taken from the Humbolt Current off the west coast of South America. Second, fish meal also comes from secondary fishing efforts (fishing for human consumption) when these fish are judged unfit for the human market.

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[4]Atlas/Stord, "Plantas de Harina y Aceite de Pescado" Copenhagen, Dinamarca.

Atlas/Stord experts have noted that in 1966, 57 million metric tons of fish were caught and that the world's annual production of harvestable fish fluctuates around 250 million metric tons. Therefore, one can see that we are very far indeed from exhausting the world's fish supply.

CHAPTER II

THE FISH MEAL INDUSTRY

2.1 World Market and Demand

Fish meal is a high protein additive to livestock feeds which is manufactured in Ecuador from Spanish mackerel and chuhueco. It is usually mixed with other feed materials, such as alfalfa meal, bran, or other vegetable materials. The product also contains a large percentage of oil, which is sold at a higher price than the meal itself.

The feeding of fish meal to animals has brought about noticeable increases in the production of milk, bacon, and eggs, to name only a few of its benefits. The demand for fish meal is rooted in the physiology of chickens and hogs, which, unlike cattle and sheep, have only one stomach and are unable to synthesize certain amino acids essential to their nutrition. Protein-rich fish meal is able to supply these amino acids, in addition to vitamins and minerals, and an unidentified growth factor that promotes growth in young fowl and pigs.[5] Whenever the fish meal has been properly mixed with other materials a 20% weight increase in the animals has been noticed after a number of different feedings.

The price of fish meal relative to other protein sources depends on the total fish meal market; although at very high or low prices the demand response to price changes may become quite inelastic. The

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[5]Michael Roemer, Fishing for Growth: Export-Led Development in Peru, 1950-1967, p. 61.

world demand curve for fish meal is, of course, the horizontal summation of all such individual demand curves. But it is not a simple step from knowledge of the demand curve for one rational buyer, using fish meal for a specific purpose in a given market, to the aggregate curve. How the curve varies depends on the prices of competing nutrients, the location of the market and the uses of meals. The company under study, Industria Pesquera Jambeli, has its potential market widely separated around the world. Many different nations require fish meal and fish oil, although Japan, Germany, Colombia, Venezuela, Guatemala, Nicaragua, and Mexico represent the main buyers. Because of the prices offered by buyers, in relation to the world meal price, Jambeli gives these countries first preference for its products. The important figures given in Table 2-1 by Oil World Magazine[6] indicate the fish meal situation from 1971 through 1976 and the expected world stocks, production and consumption for the period of October/September for 1976/1977 respectively. The data for fish meal consumption is plotted in Figure 2-1, which shows the abrupt change in the pattern for world consumption for the period of 1971 through 1977. This change is almost entirely a result of the decrease in Peruvian production. The Peruvian debacle came at the end of 1972 due to the three factors already stated:

1. political disturbances in the country,
2. shifts in the Humbolt Current, and
3. fishing practices of foreign nations which destroyed a basic part of the fish food chain.

As a result, the Peruvian fish meal industry was not able to produce even 50% of what it actually did during the period before these events.

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[6]Adapted from Oil World Magazine (Vol. XX, No. 13, 1977), p. 297.

Table 2-1. Fish Meal: World Supply and Demand Balance
(1,000 Metric Tons)

	October/September					
Opening Stocks	76/77	75/76	74/75	73/74	72/73	71/72
Norway	141.5	146.5	155.0	137.9	150.1	221.2
Chile	48.7	28.8	39.8	10.5	2.0	45.1
Peru	101.0	167.1	162.0	72.0	67.4	662.5
Other Main Exporters (a)	75.4	115.3	184.6	98.4	96.0	126.9
Other Countries	343.4	362.3	312.6	261.2	469.5	364.3
World	710.0	820.0	854.0	580.0	785.0	1420.0
Production	4600.0	4387.0	4456.0	3969.0	3831.0	4782.0
Total Supply	5310.0	5207.0	5310.0	4549.0	4616.0	6202.0
Consumption (b)	4510.0	4497.0	4490.0	3695.0	4036.0	5417.0
Ending Stocks	800.0	710.0	820.0	854.0	580.0	785.0

(a) Denmark, Iceland, and S. and S.W. Africa
(b) Residual of the balance, including report errors, if any, in other items of the balance.

In recent years its production has held steady at approximately 900,000 tons per year. Consequently, fish meal production and consumption have been lowered. These factors reflect the main aspect of the world fish meal situation.

In spite of the usual events which have influenced world production and consumption, it may be useful to examine the use of simple linear regression to forecast consumption for a ten-year period. Since the data point shown for the period 1971/1972 gives an abrupt deviation curve pattern, the data given for the periods 1972 through 1977 will be used for the forecast analysis. The simple linear function of time could be written as[7] $X_t = b_1 + b_2 t + E_t$, where b_1 and b_2 are the

[7]Douglas C. Montgomery and Lynwood A. Johnson, Forecasting and Time Series Analysis (New York: McGraw Hill, Inc., 1976), pp. 20-21.

intercept and slope, respectively, and E_t is the random deviation from the mean in period t. Denoting the estimators of b_1 and b_2 by $\hat{b}_1$ and $\hat{b}_2$, the fitted model is $\hat{X}_t = \hat{b}_1 + \hat{b}_2 t$.

The least squares normal equations may be written as

$$\hat{b}_1 \sum_{t=1}^{T} + \hat{b}_2 \sum_{t=1}^{T} t = \sum_{b=1}^{T} X_t$$

$$\hat{b}_1 \sum_{t=1}^{T} t + \hat{b}_2 \sum_{t=1}^{T} t^2 = \sum_{t=1} tX_t$$

Since $\sum_{t=1}^{T} t = T(T+1)/2$ and $\sum_{t=1}^{T} t^2 = (T+1)(2T+1)/6$, we may easily solve the normal equations for the estimators b_1 and b_2. The solution is

$$\hat{b}_1(T) = \frac{2(2T+1)}{T(T-1)} \sum_{t=1}^{T} X_t - \frac{6}{T(T-1)} \sum_{t=1}^{T} tX_t$$

$$= \frac{2(10+1)}{5(4)} 21,228 - \frac{6}{5(4)} 65,434$$

$$= 23,350.80 - 19,630.20$$

$$= 3,720.60$$

$$\hat{b}_2(T) = \frac{12}{T(T^2-1)} \sum_{t=1}^{T} tX_t - \frac{6}{T(T-1)} \sum_{t=1}^{T} X_t$$

$$= \frac{12}{5(25-1)} 65,424 - \frac{6}{5(4)} 21,228$$

$$= 175.00$$

The estimators $\hat{b}_1$ and $\hat{b}_2$ depend upon the point in time that they are computed, i.e., T.

The forecast, made at the end of period T for some future time period, say T + Z, would be denoted by $\hat{X}_{T+Z}(T)$, and is computed from

$$\hat{X}_{T+Z}(T) = \hat{b}_1(T) + \hat{b}_2(T)[T+Z]$$

Projected consumption obtained by these calculations is shown in Figure 2-1. These forecasts seem to indicate a slow increase in fish meal consumption. However Oil World Magazine[8] has estimated that the world fish meal production is likely to increase by more than 200,000 tons or almost 5% this current season (1976-1977), but for two reasons world consumption will probably stagnate near last season's level. First, world carryover stocks last October 1 were down about 110,000 tons to the lowest level since the scarcity year 1973. This means that the total supply this season will be up only an estimated 100,000 tons. Furthermore, prices are at an uncompetitively high level, so that demand has been rather slow so far this season and is expected to remain slow for some time to come. Analysts, therefore, predict world fish meal consumption to stagnate at about 4.5 million tons in the

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[8] Oil World Magazine, Special Issue 1 (Vol. 13/XX, April, 1977), pp. 297-298.

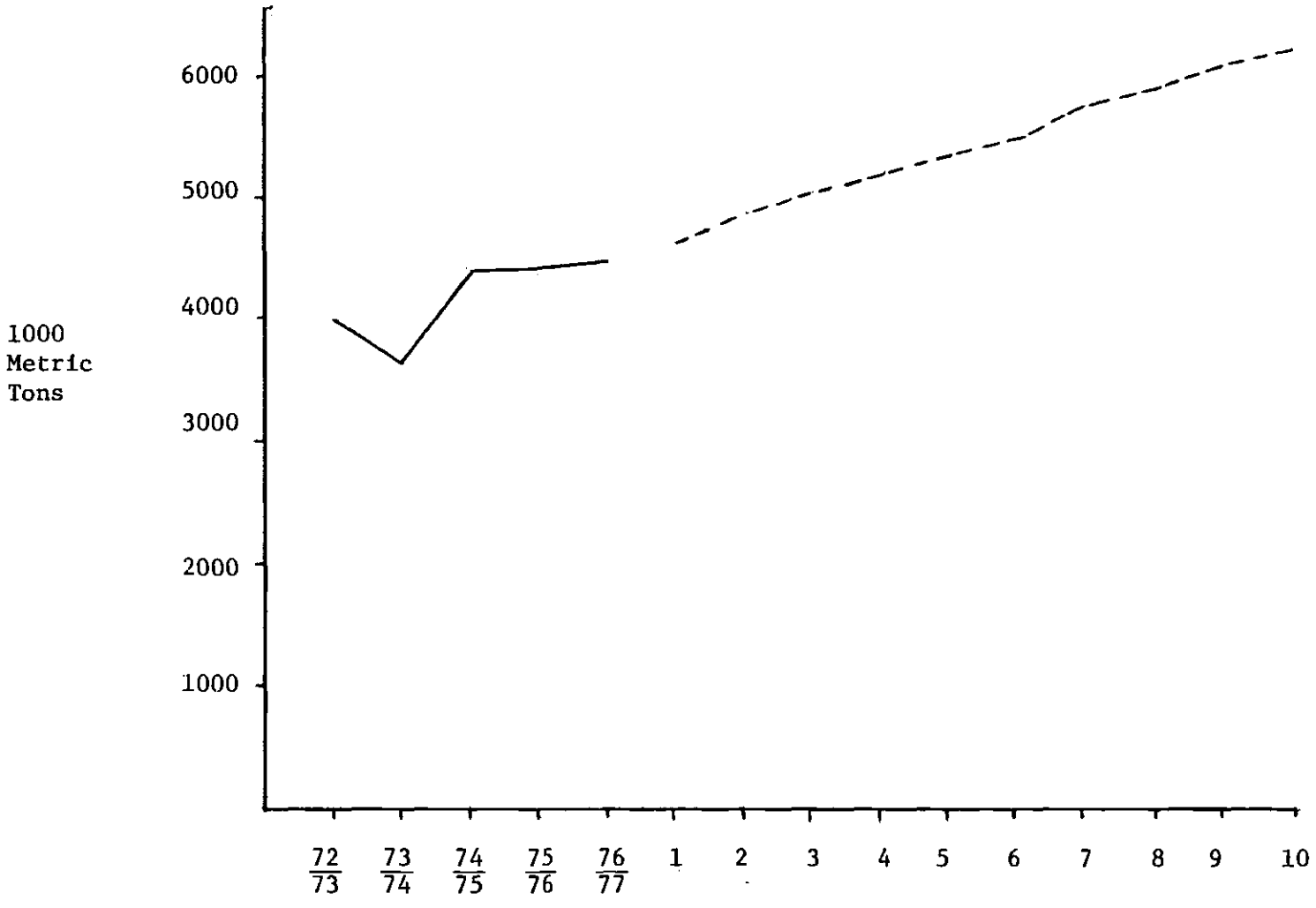

Figure 2-1. Fish Meal: World Consumption and Forecast

third successive season. Consequently, world stocks will recover to the more normal level of about 0.8 million tons. On the surface, forecasted consumption and Oil World Magazine estimates of consumption both fail to indicate a need for capacity expansion. However, it is important to note that these forecasts of consumption are perhaps being limited by the availability of fish meal. The current high price level and the low level of carryover stocks imply that world demand exceeds actual consumption. Even if future demand is stable, Jambeli may find it profitable to expand because of its locational advantage and present small share of the total market.

Industria Pesquera Jambeli produces less than 1% of the world's total fish meal production (actually less than 0.5%), and all of this production is sold to the world market, principally to those nations already specified. If the situation presents itself that the company will represent 1% of the world's total fish meal production or more, then the situation might differ in certain aspects.

In the fish meal world market there is also a by-product widely used and obtained in the process, known as fish oil. This product has many important uses such as for the production of margarine, soap, and paint, and other products. The content of oil varies among the different classes of fish from which it is extracted, and also depends on the time of year when fish are caught. In Ecuador, as in many other foreign countries where the spanish mackerel and chuhueco are the main sources of raw fish, the time of the year plays an important role. The mackerel which is a migratory specie found from January to April, starts the season with 8% of oil and finishes with 1.3% to 2%.

The chuhueco which is found in the zone of the Gulf of Guayaquil starts and finishes its cycle with an equal amount of oil of 3.5%, and that is from May (or sometimes April) to December.

2.2 Competition

The demand for fish meal depends on its price relative to other protein sources, principally soybean. Fish meal almost in all cases is priced higher than soybean meal. However, fish oil prices are sometimes lower than those of soybean oil. Since World War II, world markets for fats, oils, and high-protein meals have grown in both value and complexity. Markets for some commodities have grown rapidly and others more slowly. In virtually all cases, however, both production and trade have expanded to meet rising demand stimulated by population and income growth around the globe.

The soybean is a product which has enjoyed a long, almost unbroken upward demand since the 1940's. It is common to hear soybeans referred to as the "miracle crop". The rapid expansion of production, utilization, and trade was not a miracle in the ordinary sense of the word. It did, however, result from a fortuitous combination of both economic and scientific developments.

Consider the production side first. Although soybeans are a legume (glycine max), they generally grow best under soil and climatic conditions which also favor corn and other feed grains. The midwestern United States is the world premier corn-growing region. Similarly, it is the world's premier soybean-producing area from the physical and

biological standpoint.[9]

The strong demand situation for United States soybean meal in Europe would have been considerably more intense were it not for the availability of large quantities of fish meal. Fish meal is not a complete substitute for soybean meal and vice versa. There are limits on fish meal uses in animal diets as in poultry. However, fish meal is an excellent food under the right conditions and throughout the world it commands a premium over soybean meal greater than indicated by the protein differential. The fish meal, as specified, is a superior source of the unidentified growth factor and of B-vitamins. Since fish meal is about 65% protein compared to about 44% of the United States soybean meal, each ton decrease in fish meal supplies can result in more than a ton of soybean meal demand.

The soybean meal production, supply and consumption have shown a greater number of tons for many years in comparison with fish meal. Oil World Magazine provides the figures in Table 2-2 which show how the soybean meal situation has behaved since 1972. As we found, world consumption of soyameal increased more than five percent during the last quarter of 1976 and approximately reached the year-ago level in the first quarter of this year. The bulk of the increase took place in West Europe, East Europe, the United States, and Brazil. Soybean meal covered about three-fifths of the total world consumption of the major oil meals since last season (on a raw protein basis even 62%).

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[9]James P. Houck, Mary E. Ryan, and Abraham Subotnick, Soybeans and Their Products: Markets, Models, and Policy (Minneapolis: University of Minnesota Press, 1972), pp. 6-14.

Table 2-2. Soybean Meal: World Supply and Demand Balance*
(1,000 Metric Tons)

	Oct/Mar		October/September				
Opening Stocks	76/77	75/76	76/77	75/76	74/75	73/74	72/73
U.S.A.: at mills	322	325	322	325	460	166	174
outside mills	295	250	295	250	500	115	160
Brazil	285	330	285	330	480	200	---
West Germany & Japan (a)	83	73	83	73	144	84	44
Other Countries (b)	570	532	570	532	690	500	649
Total	1,555	1,510	1,555	1,510	2,274	1,065	1,027
Production	22,605	22,260	43,600	44,540	36,682	38,765	33,073
Total Supply	24,160	23,770	45,155	46,050	38,956	39,830	34,100
Disappearance							
West Europe (e)	7,485	7,297	13,100	13,440	11,854	11,290	10,000
U.S.S.R. (d)	684	602	1,760	1,486	82	169	781
U.S.A. (f)	7,100	7,018	13,050	14,118	11,636	12,136	10,902
Brazil (f)	520	429	1,118	968	831	720	445
China, P.R. (d)	2,720	2,699	4,765	4,669	4,567	4,943	4,272
Japan (f)	1,046	1,099	2,100	2,221	2,014	2,181	2,341
Other Countries (c)	3,245	3,126	8,062	7,593	6,462	6,117	4,294
World	22,800	22,270	43,955	44,495	37,446	37,556	33,035
Ending Stocks	1,360	1,500	1,200	1,555	1,510	2,274	1,065

(a) At mills only. (b) Including stocks outside mills in West Germany and Japan; and in Brazil as of October 1972. (c) Residual of the balance including report errors, if any, in other items of the balance. (d) New supplies. (e) New supplies (i.e., production plus net imports), not considering stock changes at West German mills. (f) Actual disappearance, i.e., considering production, imports, exports and changes in stocks at mills and outside mills (for Japan and Brazil only stocks at mills considered).

*Taken from Oil World Magazine, Special Issue (Vol. XX, No. 13, April, 1977), p. 295.

2.3 Price Prospects

Oil World gives information on the world markets of oilseeds, oilmeals, vegetable, animal and marine oils and fats. Oil World Magazine has stated the following important issues:

> When our markets received the first indications of a substantial decline in 1976/77 world production of oilseeds, which was in early May 1976, they lived up to their historical reputation of responding early and sensitively to such a fundamental change in the situation. As will be seen from our World Market Price Indices below [Table 2-3], the prices for oilmeals were the leaders, rising sharply in May, June, and July. Oilseeds followed at first hesitatingly but then more willingly from June onward when the oils joined the boom with a lag of one month. However, between the middle of July and the middle of August much of the rise was lost again. Thereafter prices recovered but remained below the highs of mid-July in most cases until December. That is, for almost half a year our markets behaved as if no shortage was in prospect. In December 1976, it was again the meals started the boom anew, but as in May oilseeds followed only at some distance owing to the dullness of the oils. In February the situation was vice versa: the oils tried their luck at the boom, the meals fell back and consequently the oilseeds were able to follow the oils but hesitatingly. The three months ended February 1977 thus were characterized by short-lived price rises with subsequent reactions. Although in most cases the reaction did not bring prices back to the previous low, the frequent fluctuations imparted at best the impression of a creeping boom. It was not until March that the boom gained momentum in all three sectors. We are still amidst this new phase. At this point two questions arise: (1) Why were our markets so undecided and did not respond properly to such a clear-cut fundamental situation and (2) will the belatedness of the response have any consequences for the future tendency and how far will the present boom lead and when will it end? As regards the first question, we see above all two major reasons, both of them being more of a psychological than of a fundamental nature. The first is the long downward or stagnating tendency of prices lasting 28 months for meals, 19 months for oils and fats, and 18 months for oilseeds. During these long periods, which mostly coincided with the recession of general economic activity, consumers and buyers generally were lulled into a bearish and lack-lustre sentiment which could not be changed overnight. This all the less - and here the second reason comes in - as in most countries the general atmosphere in the economy remained characterized by undecidedness and uncertainties in spite of the beginning of a recovery. It appears that the

> advocates of the long wave theory are right: following the long up-trend of the twenty-five years ended in 1973, we are now amidst the long period of stagnation (in which there may be short recessions and recoveries) which according to the theory of long economic waves is also to last for about twenty-five years. During this time the future is clouded by uncertainties, investors and other market participants generally are undecided and the willingness to take risks is considerably reduced. But finally it becomes evident now that in the field of food and feed materials and products it is dangerous to think in the same categories as in the remaining industries. The demand for food and feed is among the most inelastic of all goods, while the supply is fluctuating heavily according to the influences of weather conditions and prices. In our markets, therefore, the development of the fundamental situation of supply and demand remains the decisive price-making factor in the medium to long run.[10]

Fish meal and fish oil prices have varied during the years due to different economic situations. Fish meal prices so far have had an uptrend pattern during this current year and are expected to continue in the same way, or to maintain the same prices for the coming years.

Not all the buyers pay for the goods at a given price, but a price reference is always available. The latest figures given by Oil World Magazine[11] are:

Prices in U.S. $/MT
(Lowest Representative Asking Prices)

	'77 Apr. 28	'77 Apr. 21	'77 Mar.	'77 Feb.	'76 Apr.	76/77 Oct.-Mar.	75/76 Oct.-Sept.
Fish Oil, any orig. crude, cif. N.W. Europe	575	570	497	441	327	438	349
Fish Meal, 64/65% any orig. cif. Hbg.	497	490	442	452	303	452	355

[10] Oil World Magazine (Vol. XX, No. 13, 1977), p. 283.

[11] Oil World Magazine (Vol. XX, No. 16, 1977), pp. 384-387.

Table 2-3. ISTA World Market Price Indices (a)
(Average 1971/72 to 1974/75 equals 100)

	Oilseeds (b)			Food oils/fats (c)			Oilmeals (d)			Oilseeds, food oils/ fats and oilmeals		
	1977	1976	1975	1977	1976	1975	1977	1976	1975	1977	1976	1975
Jan.	123.1	82.4	117.5	109.3	85.6	143.4	136.1	87.8	85.8	122.5	84.9	116.7
Feb.	126.2	82.9	104.5	116.9	87.2	124.5	133.3	89.0	75.5	125.3	85.8	102.7
March	141.6(e)	83.2	101.6	137.1(e)	88.2	112.7	138.1(e)	87.8	76.3	139.4(e)	85.9	98.0
April		83.3	103.0		84.0	110.8		88.7	81.0		85.0	99.3
May		90.7	92.0		80.8	94.4		99.7	77.2		90.1	88.7
June		104.6	90.7		87.2	88.9		114.2	77.5		102.0	86.5
July		112.2	97.0		97.9	101.0		123.0	81.2		110.7	93.9
Aug.		106.0	104.5		96.4	108.8		115.8	87.0		105.7	101.0
Sept.		110.7	98.1		102.7	101.7		122.8	86.0		111.5	95.8
Oct.		109.0	91.5		103.4	97.8		120.0	86.3		110.3	92.0
Nov.		111.8	84.7		105.9	90.8		121.7	85.1		112.4	86.6
Dec.		116.1	82.2		106.6	87.3		128.1	86.6		116.4	85.0
Jan/Dec		99.4	97.3		93.8	105.2		108.2	82.1		100.1	95.5
	76/77	75/76	74/75	76/77	75/76	74/75	76/77	75/76	74/75	76/77	75/76	74/75
Oct/Sept		92.9	111.5		90.5	125.5		98.9	85.7		93.8	108.7
Oct/Feb	117.2	84.7	130.0	108.4	89.7	157.7	127.8	87.0	92.8	117.4	86.9	128.3

(a) The individual oilseeds, oil/fats and oilmeals have been weighted with their respective portion in world net exports. (b) Soybeans, groundnuts, rapeseed, copra, palm kernel, linseed. (c) Soybean, cotton, groundnut, sunflower, rape, coconut, palm kernel, palm, lard, and fish oils. (d) Soybean, cotton, groundnut, sunflower, rape, coconut, lin and fish meals. (e) World market price index for March 24, 1977.

However, for the purposes of this study the following prices have been used according to Jambeli's managers' advice:

Fish Meal . . . 467 U.S. Dollars (export)
280 U.S. Dollars (home market)

Fish Oil . . . 480 U.S. Dollars (home market)

Again, it is important to note the dominant role that Peru plays in the fish meal industry. When Peruvian fish meal was available in great amounts some years ago, the price of the meal was set around 100 to 200 dollars, but after the Peruvian production went down from 2,000,000 tons per year to 900,000 tons the price of both the meal and oil experienced a tremendous increase, sometimes as high as 600 U.S. Dollars c&f per metric ton (in Europe).

Oil World Magazine experts[12] have estimated that the meal and oil prices are going to level out near 400-500 U.S. Dollars during the coming months and years.

2.4 Implications for Development of the Fish Meal Industry in Ecuador

The Peruvian situation plays an important role in the fish meal industry in Ecuador as already indicated. However, the history of the fish meal industry in Ecuador is not the same as in Peru. Moreover, it will not be possible to replicate the fish meal industry on a large scale in many developing countries.

Industria Pesquera Jambeli will face many problems which, in one way or another, could delay its projected expansion planning. One major difficulty is due to the fact that, as yet, no study has been

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[12] Ibid.

made of the fish population in Ecuadorian waters. This situation has created a concern for all fishing activities. Although no restrictions have yet been placed on fishing and the production of fish meal, it is widely known that the Ecuadorian government will soon implement laws restricting the growth of already existing fish meal plants and forbidding the construction of new ones. The exact requirements of such laws are not known yet, but they will be promulgated in the near future. The government does not want more fish to be caught without first undertaking ecological studies.

The sources of fish meal as a staple strongly suggest two important possibilities: fish flour for human consumption and the preservation of seafood in several forms. The use of fish flour simply reduces further the protein chain from sea to man. When exploited as guano, the protein travels from plankton to fish to birds to fertilizer to plants to grazing animals and finally to humans; as fish meal, the birds, fertilizer, and plants are eliminated and chickens and hogs are substituted for grazers; with fish flour, the animals are also eliminated. (The next step in reducing the chain will be to eliminate the fish also, using sea vegetation directly as human food.) Although problems of quality control will be greater and the equipment perhaps a bit more sophisticated, fundamentally the reduction of fish for human consumption resembles that for animal consumption. Although the market is inchoate now, it promises to be a growing one and several underdeveloped countries have the resources to supply it. The canning and freezing of fish for export should also have the properties conducive to linkage formation and may afford growing markets for some developing

countries. In both these cases and in many of the others mentioned in this section, the extent of the resources is a problem.[13]

2.5 Ecuadorian Production: Fishing

The Republic of Ecuador is located on the northwestern coast of South America and a large portion of it straddles the equator. The two adjacent countries are Colombia on the north and Peru on the south. The Pacific Ocean provides the western boundary. Additional geographic details are shown on Map 2-1.

As previously stated, in Ecuador fish meal is manufactured almost entirely from spanish mackerel and chuhueco. The case of Ecuador is not the same as that of Peru where anchovies are the main raw material and are found in great numbers along the 1400-mile coast. The abundance of the anchovy and other marine life in Peruvian waters is due to the Humbolt Current, a stream of cool water, 120 to 180 miles in width, which originates in the southeast Pacific, encounters the west coast of South America in northern Chile, and flows along the coast almost to Ecuador where it turns west just south of the equator.[14] Because plankton exist in abundance in these waters, anchovy thrive in the current. Ecuador, however, does not receive the anchovy during any part of the year. Therefore, Ecuador's fish meal raw materials are other than anchovy.

The two fish species mainly used for the production of fish meal

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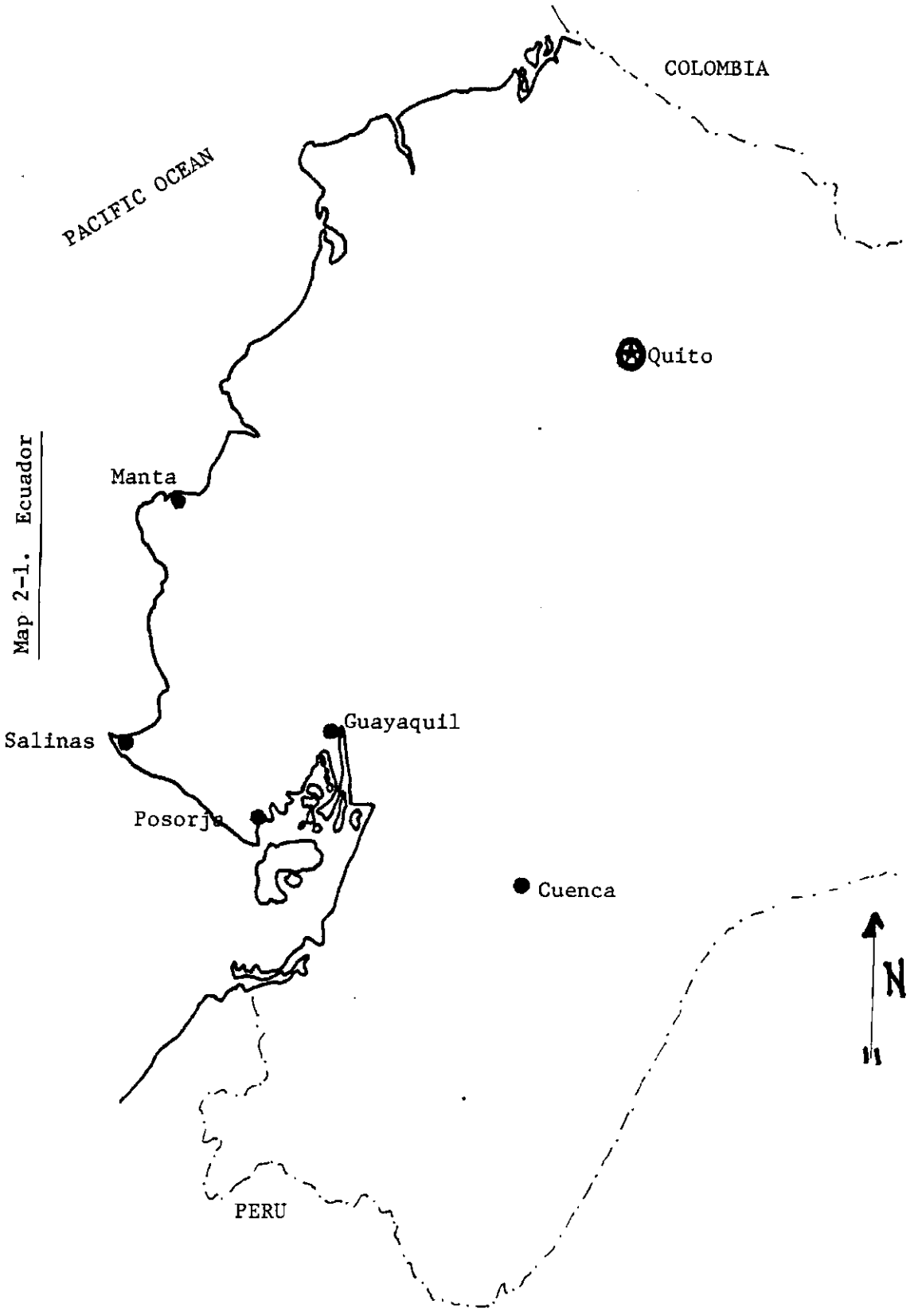
[13] Adapted from Fishing for Growth: Export-Led Development in Peru, 1950-1967, pp. 170-171.

[14] Ibid.



Map 2-1. Ecuador

in Ecuador do not have the same characteristics as mentioned above. Plankton, the animal and vegetable organisms that form the basis for all marine life, are abundant in the zone of the Gulf of Guayaquil where rivers make up the main waterway transportation system. Due to the plankton factor in that area the chuhueco is always found for the necessary uses; that fish species runs in those waters from April to December.

Timing of the fishing activities is important. The raw material can not be preserved due to the changes in temperature it will undergo and the unpreserved fish will substantially decompose within 24 to 48 hours of being caught, the period being shorter the smaller the fish and the higher the water temperature. This situation implies an upper limit on the allowable elapsed time between catching and processing the fish. But there is also a continual loss of oil and protein content which makes it important to get the fish into port in the shortest time possible.

Industria Pesquera Jambeli, as many other fish meal manufacturers in Ecuador, makes its catch only during twenty days out of a month. These days are determined by the phase of the moon, i.e., when there is a full moon no fishing is possible. Besides the moon factor, which enables the company to send boats out only twenty days per month, there are a number of days the company uses for maintenance and repair when no fishing activities are performed. Totaling the days per year, Jambeli has 165 days of regular operations, and that number of days was used during this study to get the most reliable figures.

The largest boats employed in number to catch mackerel and

chuhueco in Ecuadorian waters are about 65 feet in length, with a hold capacity of 120 tons of fish. However, all the boat increments made in this thesis were based on 180 tons of fish capacity due primarily to a decision made by the managers of Industria Pesquera Jambeli. The boats are constructed in Peru and, in addition to a marine engine and nylon net, the bolicheras, as they are called in Peru, are equipped with a radio, a power block for retracting the net, and a pump for transferring the fish from the net to the hold; none of these was standard equipment a few years ago. Furthermore, most of the boats in Ecuador have echo-sounders for finding the fish. A 180-ton boat costs approximately 285,000 U.S. Dollars, including the net. These boats are taken to sea by a crew of seven men, including the captain. Each crew is paid entirely under a piece rate system, that is, 120.00 Sucres per ton caught which comes to 4.80 U.S. Dollars per ton.

The boats put to sea shortly after midnight and usually arrive at the suspected fishing grounds around daybreak. The search for the fish, whether it is mackerel or chuhueco, is based partly on the experience of the past few days and very largely on the intuition of experienced captains. When the fish have been located, the nylon net is ejected into the water and spread. Lead weights drag the lower edge of the net downward, while rubber floats keep its top edge on the surface. Once the fish have been surrounded, the bottom of the net is closed and part of the full net is hauled onto the deck by the hydraulic-operated power block. Then as the fish come to the surface, they are pumped into the hold. Two or three good net-loads of fish will fill the hold of a boat and since it takes two hours or more to deploy, recover, and empty

a net, it is obviously advantageous to fill the hold with as few net-loads as possible.[15] When the hold is full, or in any case after dark, the boat returns to port. When it arrives, it puts in at a dock which is equipped with a pump to transfer the fish from the boat to a pipeline. The pipeline carries the fish directly to the plant.

Fish meal is not the only product of the coast of Ecuador; there are other companies which are occupied with other marine animals such as shrimp, tuna, sardines, and lobsters. In spite of the many fishing activities along the coast of Ecuador, so far no ecological studies have been made by the Ecuadorian government; and in fact it is unknown whether or not the fish will continue to thrive in Ecuadorian waters for any length of time. However, reliable sources have indicated to the author that such a study will be made in the near future.

Ecuador is one of the first countries to impose the 200-mile sea limit which has brought controversy between its neighbors and the United States as well. However, Ecuador is a small and underdeveloped country and therefore has to protect its own national resources because it depends on them.

2.6 Fish Meal/Oil Processing

The processing of such fish species as the spanish mackerel and chuhueco to fish meal consists basically of cooking, pressing, drying, and milling the fish until a dry meal is achieved. The meal produced from the dry substance contains 60% to 65% of protein, of which about 90% is digestable. The meal also contains a small amount of oil (4-

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[15]This type of fishing has been described by J. Hedges in "Drama of the Catch", Andean Airmail and Peruvian Times (October 28, 1963),p.34.

10%). The oil content should be as low as possible, as a high oil content may reduce the storage ability and also possibly affect the taste of the chickens and pigs fed with the meal.[16] If the case presents itself where the raw material contains so much oil that a de-oiling has to take place, a complete fish meal and fish oil plant has to be used. If, however, the raw material is lean, i.e., if it can be established beforehand that the meal will have a sufficiently low oil content without removal of the oil (and that oily fish will never be used as raw material in the future), a plant used only for drying the raw material can be installed.

Industria Pesquera Jambeli's process consists of a complete fish meal and fish oil plant (see Figure 2-2). By this expression the author is referring to a plant consisting of a steam-heated cooker, a screw press, a drier, separators for press liquid, and a stickwater plant.

An extremely important stage is the cooking process as the raw fish must be cooked properly to make the protein coagulate and to burst the oil-containing cells. The steam cookers are intended for direct steam injection.

The next important step is the removal of solids from the liquid after cooking. A screw press is used for this purpose. The effectiveness of the screw press is, however, dependent on the quantity and the consistency of the cooked mash. If the quantity varies, the press portion or the number of revolutions of the press has to be adjusted. Corresponding adjustments must also be made if the consistency of the

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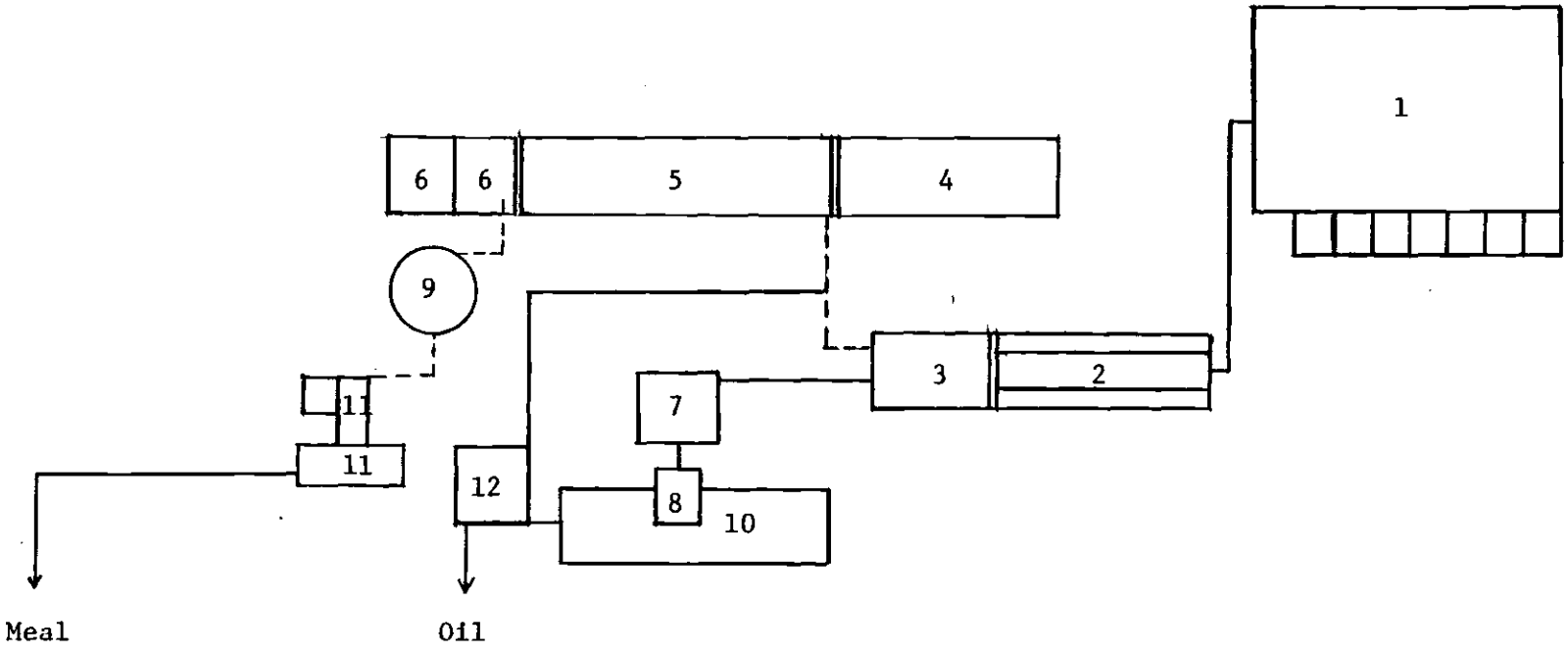
[16]Adapted from "Fish Meal Production" by S. Christensen. United Nations Industrial Development Organization (June, 1974), pp. 23-28.



1. Raw Fish Storage
2. Cooker
3. Press
4. Heater
5. Dryer
6. Extractor
7. Solid Separator
8. Centrifugal
9. Cyclone
10. Stickwater Plant
11. Mill
12. Separator Concentrator

Figure 2-2. Jambeli's Processing Plant

cooked fish mash varies.[17]

The drying of the solids coming from the press is accomplished in a steam drier. The liquid phase from the press is treated in a centrifugue for the removal of suspended solids and then treated in a separator to recover the oil.

The water phase leaving the press liquid separator contains dissolved solids which are recovered by concentrating the stickwater. The fish meal having a concentration from a stickwater plant is designated "the entire meal."

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[17] Ibid.

CHAPTER III

INDUSTRIA PESQUERA JAMBELI

3.1 Present Situation and Background

There are twenty different fish meal plants in Ecuador, and Industria Pesquera Jambeli is one of the two major producers of the product. Jambeli is excellently located in Posorjar. However, its main office is located in Guayaquil which is the most important port and economic center of the country. The name of the company was changed from Hidromecanica Naval Posorja to its current name at the end of 1975, when the company was sold to a group of businessmen.

The new management began its operations in January, 1976. At that time the fleet was composed of only two boats of 110 and 140 tons each. By the first day of May the company had added four more boats of 110, 150, 70, and 90 tons each, giving them a total fleet capacity of 670 tons per catch. During the last year, the company's fleet brought to port a total fish meal output of 13,399.75 metric tons; and a fish oil content of 4,466.58 metric tons.

Fishing operations are not successful when there is a full moon and boats normally stay in port at this time, limiting their activities to about 20 days per month. The number of working days per year is reduced to 165 when allowances are made for maintenance and repair; thus the number of working hours per day range between 18 and 24, depending on the amount of raw fish to be processed. Jambeli's processing plant,

shown in Figure 2-2, has a maximum installed capacity of 40 metric tons per hour of raw material. One of the most common difficulties faced by such companies as Jambeli is the problem known as "Piratory". Sometimes the captains of the boats make stops before reaching port to sell all or part of their catch for their own profit. This practice produces great losses for the company. Jambeli is fighting against that situation even though it will probably not be possible to control it totally.

3.2 Market

It seems quite clear that the vigorously growing export sector in Ecuador has provided a strong stimulus to the economy, but the precise nature of that stimulus is not easy to sort out. Perhaps the best way to determine the role of exports in Ecuadorian growth, and at the same time to decide if investments did act as an independent force, would be to capture the essential features of the Ecuadorian economy in an econometric model and then to stimulate the economy's behavior with exports being the only growing exogenous variable, but this is beyond the scope of our study. However, without any doubt, it is private investment which has actually pushed the national economy to a higher standard.

As indicated previously, Jambeli's exports go primarily to Japan, Germany, some neighboring countries and Central America. Two percent of its actual annual fish meal goes to the home market, and the rest to overseas. The fish oil situation is somewhat different; due to the better price offerings in the home market, all of the company oil out-

put stays in Ecuador, where it fetches 480 U.S. dollars per ton produced. However, there is hope in such a developing country as Ecuador to eventually provide additional markets for such primary products, which in turn will make it easier for many to escape from stagnation by means of growing primary exports.

3.3 Labor

The total population in Ecuador is very unevenly distributed over the land mass. This is due in part to the lack of employment opportunities in the rural areas and the constant attraction of the urban centers such as Guayaquil and Quito. Jambeli's employment figure shows a total of 60 employees, which is the average number of employees for other fish meal plants in the country.

Fish processing is complicated enough to require at least one qualified engineer on the premises; he is typically the plant manager. Industria Pesquera Jambeli's demand for professional people is specialized toward mechanical, electrical, and chemical engineers or toward people with experience in the fish meal industry who are capable of running the plant. The functions of maintenance and repair are especially important in any fish meal factory, since the malfunctioning of any piece of equipment is likely to shut out down a third or half of the plant's capacity.

Although the fish meal industry itself has been an absorber of skilled workers, the mechanical industries in Ecuador stimulated by it have been suppliers of skilled labor to the rest of the economy. An important fact is also the handsome payments, principally because of

the strenuous work at sea. Jambeli's pays all of its crew members by the piece rate, that is, 120 Sucres (or 4.80 U.S. Dollars) per ton caught.

3.4 Capital

Industria Pesquera Jambeli's sources of funds need to be interpreted with an eye to conditions in Ecuadorian financial markets and in the fish meal industry. The Central Bank of Ecuador, in order to facilitate expansion, production, and exportation, lends what is known as "prestamos sui-generis" with collateral guaranties of the finished products (fish meal and fish oil). There are not many commercial banks in Ecuador which lend money for more than a year, which makes it difficult to arrive at a sensible estimate of the debt-equity ratio. Most of Jambeli's transactions dealing with the fleet investment are made with the "Banco Industrial del Peru" due to the fact that the boats are acquired in that country.

The government of Ecuador has specified the following rules for the current financial development of the fish meal industry: (1) From the net income before taxes, a 15% employee participation must be deducted as an expense; (2) From the net income the company will deduct an amount known as "abonos tributarios" which is an incentive for the exportation, amounting to 7% of meal sales and 11% of oil sales; (3) After the employee participation has been deducted and the abonos tributarios retained, 50% of the net income is also deducted for the final taxes purposes. All of these are shown in the income statements in the following chapter.

CHAPTER IV

EXPANSION STRATEGIES

4.1 The Expansion Planning Problem

Jambeli's needs of expansion have been clearly stated by its managers since the first day of operations of the company. As Table 4-1 shows the company started its expansion implementation at a very early stage of the regular activities. By May 1976, four boats were introduced to the total fleet which increased the total fleet capacity from 250 to 670 tons. The daily catches for 1976 are listed in Table 4-2.

The company's desires to expand, however, depend on the action to be taken by the Ecuadorian government in relation to the lack of ecological studies. Even though the company expanded during their first year of operations, expansion is not likely to continue until something is done to estimate the marine life in the nation's waters. After the problem is solved the company hopes to expand up to a limit that will be specified by such factors as world fish meal and fish oil demand and production. However, if growth rates were to be specified by the government then the company will have to adopt such rates, which are likely to be low.

Besides the lack of ecological studies there is another factor that affects the expectations of fish to be caught. This factor is the unpredictability of the sea. Even though the figures given in

Table 4-1. Tons of Raw Fish Caught by Boat

Year 1976	Boat 1 110 T	Boat 2 140 T	Boat 3 110 T	Boat 4 150 T	Boat 5 70 T	Boat 6 90 T	Total Tons Per Month
January	782	1360	--	--	--	--	2142.00
February	946	1150	--	--	--	--	2096.00
March	1078	920	--	--	--	--	1998.00
April	806	870	--	--	--	--	1676.00
May	431	274	127	609	971	74	2486.00
June	1087	1064	373	1368	499	1097	5488.00
July	1451	1357	769.5	1671	920	980	7148.50
August	917	1247	907.8	937	1073	1139	6220.80
September	1222	1125	719	1205	1236	1316	6823.00
October	1321	1057	443	1450	803	1195	6269.00
November	901	836	484	1237	893	862	5213.00
December	1100	1615	1290	1619	1350	1298	8272.00

Total of Raw Material = 55832.30

Table 4-2. Tons Of Raw Fish Caught On A Day Basis

	January	February	March	April	May	June	July	August	September	October	November	December
1	80	137.5	109	183	91	570.5	593.5	613.5	408	253	450	637
2	50	117.5	100	185.5	225	640.5	595	624.8	499	273	387.5	586.5
3	70.5	142	99.5	169.5	239	591	630	573.5	480	322	489	641
4	100	115	98	145.5	278.5	652	610	623	424	404	411	526
5	100	80	152.5	173	124	618.5	644	615	577	422	345.5	599.5
6	70	100	191.5	174	205	646.5	600	604	420	385	278	584.5
7	190	70	111	163.5	273.5	406.5	602	598	520	405	235	655
8	135	117	165	167	282.5	402	509	433	579	425	212	573
9	74	121.5	182	188	322.5	532.5	500	480	534	328	202	594
10	86	98	208.5	127	445	428	420	596	325	399.5	231	628
11	93	97	172	--	--	--	499.5	460	380	433	306	659
12	120	120	199	--	--	--	630	--	444	320	385	591
13	99	100	210	--	--	--	315.5	--	351	230	400	298
14	93	133	--	--	--	--	--	--	300	323.5	401	425.5
15	185	122.5	--	--	--	--	--	--	582	273	480	274
16	186	150	--	--	--	--	--	--	--	421	--	--
17	210.5	175	--	--	--	--	--	--	--	652	--	--
18	200	100	--	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--	--	--	--
	2142	2096	1998	1676	2486	5488	7148.5	6220.8	6823	6269	5213	8272

Tables 4-1 and 4-2 indicate an increase in raw fish caught, due to the number of boats available, they do not actually show a steady pattern of capture due to the uncontrollable sea and catch conditions. An important element in the total catch of each boat is the captain's experience along with his astuteness.

4.2 Approach

Capacity expansion planning for Jambeli is not an easy task. Factors such as the small amount of data available, the lack of ecological studies, and the unpredictability of the sea prevented the use of known methods of approach in order to develop an optimal expansion plan. Because of this, it was decided to evaluate specific growth rates and to determine the financial consequences of each. After consideration of several alternatives, growth rates of 10% and 15% were specified. The selection was based mostly on the anticipated goals of the government of Ecuador relative to the growth limits for fish meal plants. In addition to these growth alternatives, analysis of 0% growth was also made as a basis for comparison.

Output of fish meal and fish oil may be increased by incremental increases in the fishing fleet and/or plant production capacity as follows:

1. Invest 20,000 U.S. Dollars for a new extractor (if not in place) which will increase the current processing capacity by 20 more tons of raw fish per hour.

2. Invest 479,012 U.S. Dollars for a new processing line (without extractor) which will increase the current processing capacity by 40 tons of raw fish per hour.

3. Invest 285,000 U.S. Dollars for a fishing boat of 180 tons capacity.

According to company management, no other capacity expansion alternatives are considered practical because of Jambeli's structure and/or management preference.

In order to convert the amount of raw fish catch to a final product, the following conversion factors were applied:

Fish Meal = 24% of raw fish processed
Fish Oil = 8% of raw fish processed

These conversion factors are the ones which the company actually realizes from current production. They apply to all incremental increases in plant processing capacity.

In order to arrive at a capacity expansion plan to achieve a specified growth objective, it was first necessary to determine the relationship between fleet capacity and the raw fish actually processed for a given plant processing capacity. It was recognized that if plant processing capacity and fishing fleet capacity were perfectly matched the plant would never achieve full output capacity because of the variability in the actual catch. However, if fish fleet capacity were too much greater than plant capacity, losses would result when the catch exceeded plant processing capacity, since fish caught one day must be processed within 24 hours or they will spoil. The specific question was, "How much larger than the plant capacity should the fleet capacity be in order to obtain the maximum output without loosing fish?".

Based on the factors specified above, a Monte Carlo simulation was developed to determine the relationship between fleet capacity and processing plant capacity. The simulation was based on 165 days using random numbers which were identified with average values representing

the percent of fleet capacity which indicated the daily catch to be processed. The simulation results were used to determine decision rules for fleet capacity as a percentage of plant capacity.

For each of the two growth rates capacity expansion plans were developed utilizing appropriate increments of fish fleet and plant production capacity. The time in years when such increments were to be made was determined by the rules developed from the simulation.

After developing the different capacity expansion plans for both growth rates and plant/fleet capacity and decision rules, income statements and cash flow analysis were done. For the financial analysis a ten percent annual inflation rate was assigned to all the company's costs with the exception of sales prices and income taxes. The respective state and federal income taxes were accounted as 23.8% of profit after the given reductions. Based on the company's financial statement specifications the straight line method of depreciation was used for all equipment and boat acquisitions.[18]

Even though variations exist in the market for the monetary value exchange of the Ecuadorian "Sucre" an exchange factor of 25 Sucres per 1 U.S. Dollar has been used throughout this study. Calculations were also made to estimate equivalent present-worth of all receipts and disbursements for each plan.

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[18] Julio A. Hidalgo Febres-Cordero, "Industria Pesquera Jambeli: Estado Financiero"(Diciembre 31, 1976), Guayaquil, Ecuador.

CHAPTER V

RESULTS

5.1 Analytical Analysis

Using actual data for raw fish caught during 1976 by month as well as by day, a histogram was prepared showing the frequency of the catch expressed as a percent of fleet capacity. This histogram is shown in Figure 5-1. In order for the histogram to be prepared, a ton-per-day accumulation table was made which is shown in Table A-1 (Appendix). This table was constructed from fishing records and shows the number of days a specific amount of tons was caught. This tonnage was divided by the appropriate fleet capacity in order to get the percentages shown on the histogram.

An empirical probability distribution for fish catch was then prepared as shown in Figure 5-2. This distribution was used to obtain the cumulative probability distribution shown in Figure 5-3 which indicates specifically how the raw fish catch has behaved in 1976.

The relationship between fleet capacity as a percent of plant capacity and tons of raw fish processed was investigated by Monte Carlo simulation using the cumulative probability distribution described above. Simulations were conducted for each of the following fleet capacities: 50, 100, 150, 200, 250, and 300 percent of plant capacity. Each simulation consisted of 165 days representing the number of days' activities of the company during a year. The following illustrates the simulation of one day's activities for a fleet capacity of 50% of

plant capacity:

A random number is selected from a random number table (for example, .16408). Using this value as a cumulative probability and referring to the next largest cumulative probability in Table 5-1 leads to a value of .375 percent fleet capacity as the catch for that day. Since the specific fleet capacity being simulated is 50% of plant capacity, the simulated catch for the day is .375/2 or 18.8% of plant capacity. This amount represents then the simulated quantity processed for that day. The procedure is similar for the other boat capacities.

It is not until we get to fleet capacity of 200% and beyond of plant capacity that losses begin to be important. The increasing losses led to the decision to discontinue simulation for fleet capacity more than 300% of plant capacity. Table 5-2 shows the expected tons processed in percentages divided by the number of days of operations.

In order to get a better idea of how the simulation behaved, Figure 5-4 shows a graph of the analysis by which the annual output was estimated as a percentage of plant capacity in tons of raw fish processed. The figure shows a dramatic change in the slope of the curve after the boat capacity reaches 150% of plant capacity. The curve is almost leveled at boat capacities of 200, 250, and 300% of plant capacity, suggesting that additional boat capacity cannot be used effectively.

The tables and figures following this statement represent both the boat and plant capacity increments estimated as the following illustration will show:

First a future growth rate was specified, say 10 percent per year.

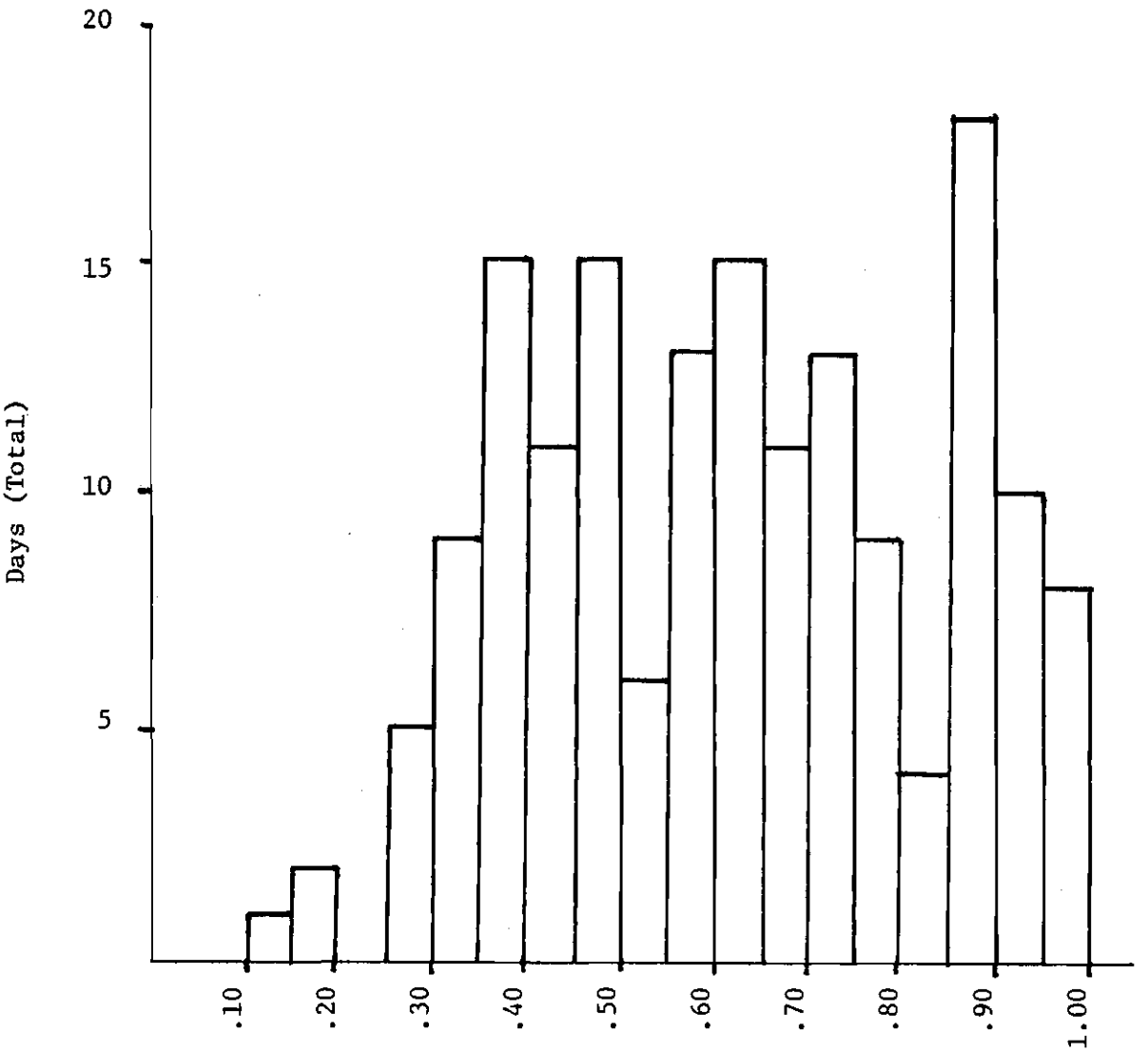

Figure 5-1. Frequency Histogram For Fish Catch

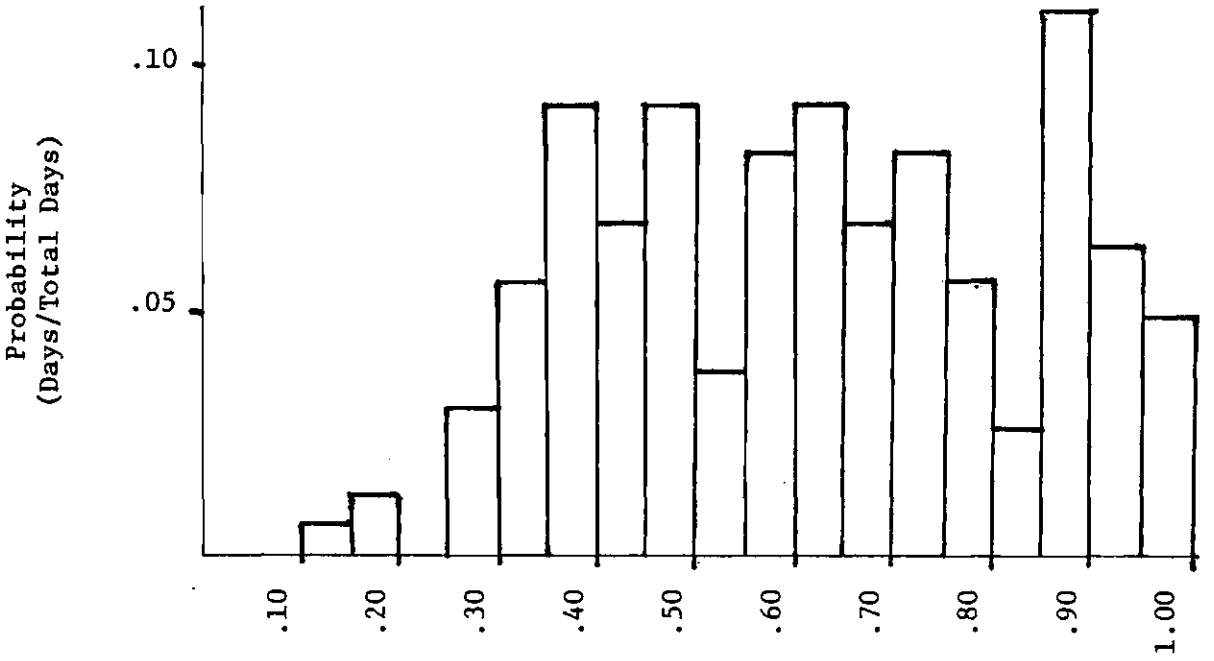

Figure 5-2. Probability Distribution of Fish Catch

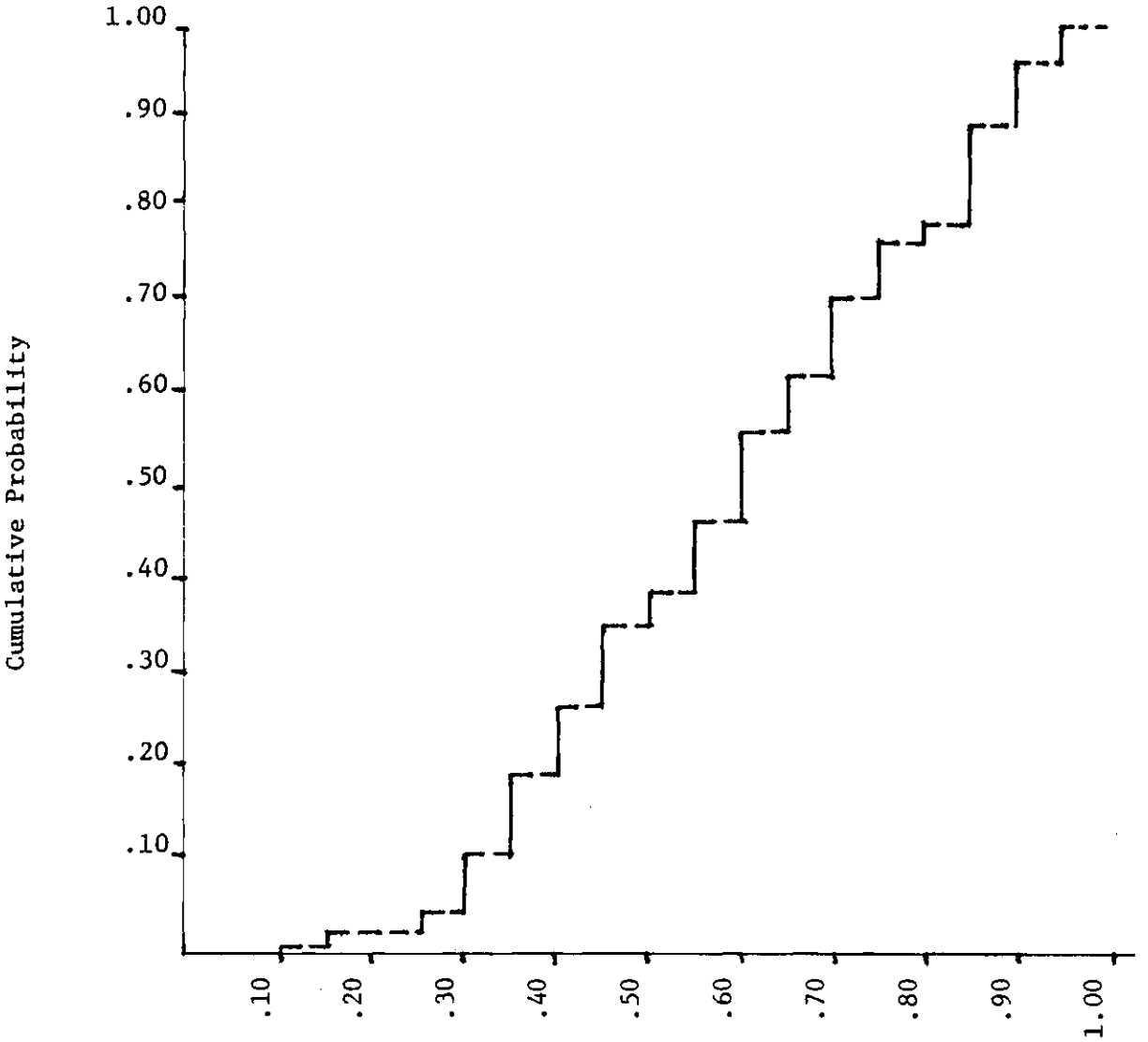

Figure 5-3. Cumulative Probability For Fish Catch

Table 5-1. Cumulative Probabilities For Fish Catch

Percent Boat Capacity Range	Mid-Value	Probability	Cumulative Probability
> 0-0.05	0.025	0	0
>0.05-0.10	0.075	0	0
>0.10-0.15	0.125	0.006	0.006
>0.15-0.20	0.175	0.012	0.018
>0.20-0.25	0.225	0	0.018
>0.25-0.30	0.275	0.030	0.048
>0.30-0.35	0.325	0.055	0.103
>0.35-0.40	0.375	0.091	0.194
>0.40-0.45	0.425	0.067	0.261
>0.45-0.50	0.475	0.091	0.352
>0.50-0.55	0.525	0.036	0.388
>0.55-0.60	0.575	0.079	0.467
>0.60-0.65	0.625	0.091	0.558
>0.65-0.70	0.675	0.067	0.625
>0.70-0.75	0.725	0.079	0.704
>0.75-0.80	0.775	0.055	0.759
>0.80-0.85	0.825	0.024	0.783
>0.85-0.90	0.875	0.109	0.892
>0.90-0.95	0.925	0.061	0.953
>0.95-1.00	0.975	0.048	1.000

Table 5-2. Fraction Of Tons Processed Given by Monte-Carlo Simulation

Expected Output as Percentage of Plant Capacity	Boat Capacity as Percentage of Plant Capacity					
	50%	100%	150%	200%	250%	30%
	0.303	0.604	0.896	0.489	0.998	1.00

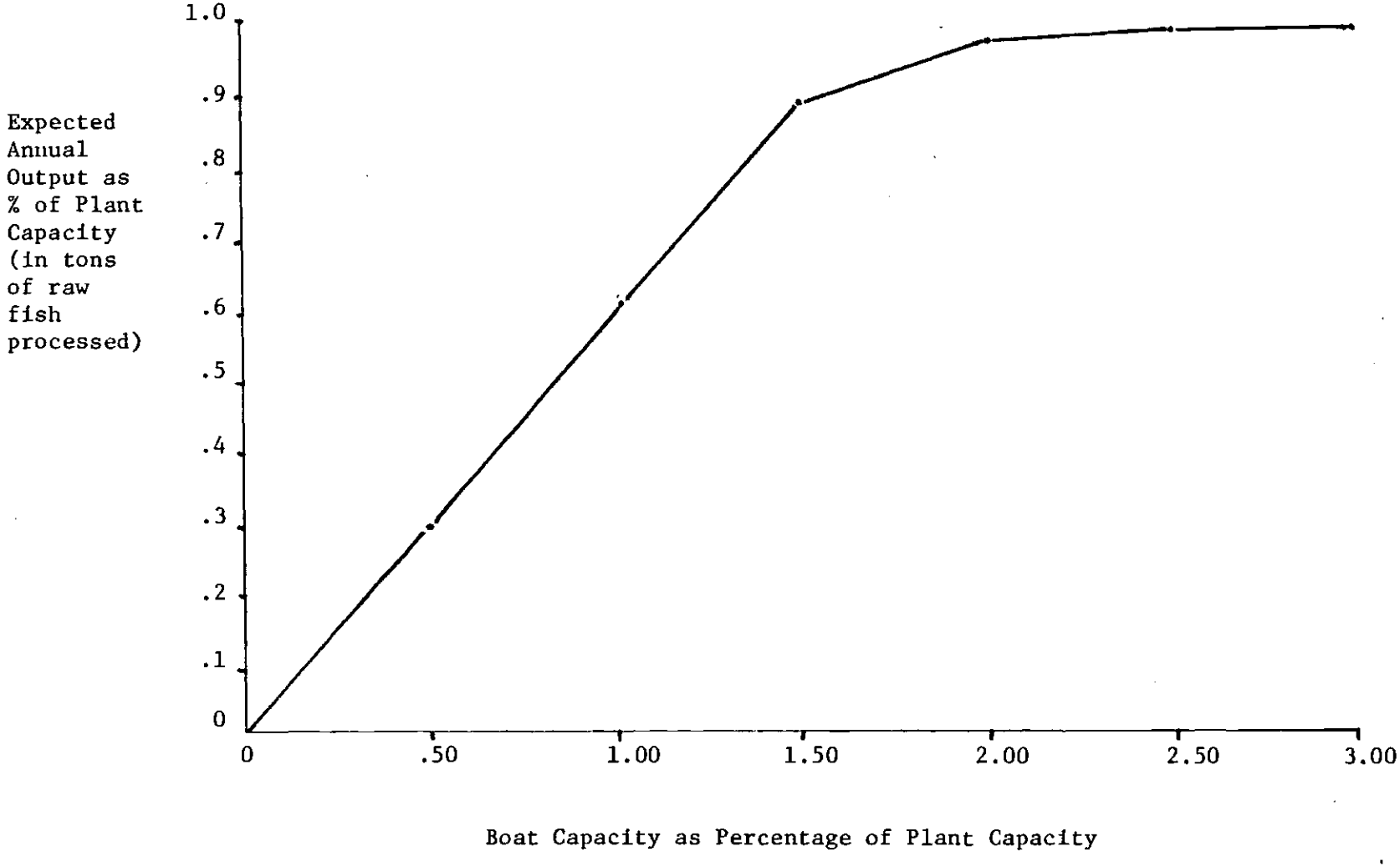

Figure 5-4. Expected Annual Output Estimated As Percentage Of Plant Capacity

Next the decision rule for increasing fleet capacity in relation to plant capacity is selected. Two decision rules were considered for each growth rate:

1. Expand plant capacity whenever fleet capacity exceeds 100% of plant capacity.
2. Expand plant capacity whenever fleet capacity exceeds 150% of plant capacity.

Each year, production is increased 10 percent to conform with the production goal. New increments in boat and plant capacity are added as needed to support this goal. If an increment of capacity is needed, then it is specified as shown in Table 5-3 which shows new production capacity for Year 5. After the fleet capacity by the plant capacity and the number obtained is then located on the graph in Figure 5-4 in order to get the expected annual output as a percentage of plant capacity. The next analysis is to get the expected annual output as a percentage of plant capacity times the 165 days and times the plant's capacity given in tons per day. The next step consists of using the 24-percent conversion factor from the annual raw fish obtained to estimate the amount of fish meal produced, and based on the same procedure the 8-percent conversion factor is used to get the amount of fish oil.

Tables 5-3, 5-4, 5-5, and 5-6 show the different analyses pertinent to the various growth rates and decision rules. Thus, Figures 5-5, 5-6, 5-7, and 5-8 show the incremental production curve specified by the growth rates and the increments of boats and plant capacity indicated by each of the decision rules. The different straight lines shown on the graphs represent those increments in capacity.

The calculations were made for two growth rates and two decision

Table 5-3. 10% Growth Rate - 100% Decision Rule

Year	Tons of Meal	Tons of Raw Fish	Total Plant Capacity (Tons/Day)	Boat Increments	Fleet Capacity	Fleet Capacity as %age of Plant Capacity	Expected Annual Output as %age of Plant Capacity (Figure 5-4)	Actual Annual Raw Fish (7 x 165 x Plant Capacity)	Expected Annual Fish Meal (8 x .24)	Expected Annual Fish Oil (8 x .08)
1	14739.73	61415.54	672	-	670	1.00	.61	67636.80	16232.83	5410.94
2	16213.70	67557.08	672	-	670	1.00	.61	67636.80	16232.83	5410.94
3	17835.07	74312.79	672	1	850	1.26	.75	83160.00	19958.40	6652.80
4	19618.58	81744.08	672	-	850	1.26	.75	83160.00	19958.40	6652.80
5	21580.43	89918.46	1008	1	1030	1.02	.62	103118.40	24748.42	8249.47
6	23738.48	98910.33	1008	-	1030	1.02	.62	103118.40	24748.42	8249.47
7	26112.33	108801.38	1680	1	1210	.72	.44	121968.00	29272.32	9757.44
8	28723.56	119681.50	1680	-	1210	.72	.44	121968.00	29272.32	9757.44
9	31595.91	131649.63	1680	1	1390	.83	.50	138600.00	33264.00	11088.00
10	34755.51	144814.63	1680	1	1570	.93	.56	155232.00	37255.68	12418.56

Table 5-4. 10% Growth Rate - 150% Decision Rule

Year	Tons of Meal	Tons of Raw Fish	Total Plant Capacity (Tons/Day)	Boat Increments	Fleet Capacity	Fleet Capacity as %age of Plant Capacity	Expected Annual Output as %age of Plant Capacity (Figure 5-4)	Actual Annual Raw Fish (7 x 165 x Plant Capacity)	Expected Annual Fish Meal (8 x .24)	Expected Annual Fish Oil (8 x .08)
1	14739.73	61415.54	672	-	670	1.00	.61	67636.80	16232.83	5410.94
2	16213.70	76557.08	672	-	670	1.00	.61	67636.80	16232.83	5410.94
3	17835.07	74312.79	672	1	850	1.26	.75	83160.00	19958.40	6652.80
4	19618.58	81744.08	672	-	850	1.26	.75	83160.00	19958.40	6652.80
5	21580.43	89918.46	672	1	1030	1.53	.899	99681.12	23923.47	7974.49
6	23738.48	98910.33	672	-	1030	1.53	.899	99681.12	23923.47	7974.49
7	26112.33	108801.38	1008	1	1210	1.20	.725	120582.00	28939.68	9646.56
8	28723.56	119681.50	1008	-	1210	1.20	.725	120582.00	28939.68	9646.56
9	31595.91	131649.63	1008	1	1390	1.38	.82	136382.40	32731.78	10910.59
10	34755.51	114814.63	1008	1	1570	1.56	.90	149688.00	35925.12	11975.04

Table 5-5. 15% Growth Rate - 100% Decision Rule

Year	Tons of Meal	Tons of Raw Fish	Total Plant Capacity (Tons/Day)	Boat Increments	Fleet Capacity	Fleet Capacity as %age of Plant Capacity	Expected Annual Output as %age of Plant Capacity (Figure 5-4)	Actual Annual Raw Fish (7 x 165 x Plant Capacity)	Expected Annual Fish Meal (8 x .24)	Expected Annual Fish Oil (8 x .08)
1	15409.71	64207.15	672	-	670	1.00	.61	67636.8	16232.83	5410.94
2	17721.17	73838.22	672	1	850	1.26	.75	83160.0	19958.40	6652.80
3	20379.35	84913.95	1008	1	1030	1.02	.62	103118.4	24748.42	8249.47
4	23436.25	97651.04	1008	-	1030	1.02	.62	103118.4	24748.42	9757.44
5	26951.69	112298.70	1680	1	1210	.72	.44	121968.0	29272.32	11088.00
6	30994.44	129143.50	1680	1	1390	.83	.50	138600.0	33264.00	12418.56
7	35643.61	148515.03	1680	1	1570	.93	.56	155232.0	37255.68	12418.56
8	40990.15	170792.28	1680	1	1750	1.04	.639	177130.8	42511.39	14170.46
9	47138.67	196411.12	2688	2	2110	.78	.47	208454.4	50029.06	16676.35
10	54209.47	225872.79	2688	1	2290	.85	.52	230630.4	55351.30	18450.43

Table 5-6. 15% Growth Rate - 150% Decision Rule

Year	Tons of Meal	Tons of Raw Fish	Total Plant Capacity (Tons/Day)	Boat Increments	Fleet Capacity	Fleet Capacity as %age of Plant Capacity	Expected Annual Output as %age of Plant Capacity (Figure 5-4)	Actual Annual Raw Fish (7 x 165 x Plant Capacity	Expected Annual Fish Meal (8 x .24)	Expected Annual Fish Oil (8 x .08)
1	15409.71	64207.15	672	-	670	1.00	.61	67636.80	16232.83	5410.94
2	17721.17	73838.22	672	1	850	1.26	.75	83160.00	19958.40	6652.80
3	20379.35	84913.95	672	1	1030	1.53	.899	99681.12	23923.47	7974.49
4	23436.25	97651.04	672	-	1030	1.53	.899	99681.12	23923.47	7974.49
5	26951.69	112298.70	1008	1	1210	1.20	.725	120582.00	28939.68	9646.56
6	30994.44	129143.50	1008	1	1390	1.38	.82	136382.40	32731.78	10910.59
7	35643.61	148515.03	1008	1	1570	1.56	.90	149688.00	35925.12	11975.04
8	40990.15	170792.28	1680	1	1750	1.04	.639	177130.80	42511.39	14170.46
9	47138.67	196411.12	1680	2	2110	1.26	.75	207900.00	49896.00	16632.00
10	54209.47	225872.79	1680	2	2470	1.47	.86	238392.00	57214.08	19071.36

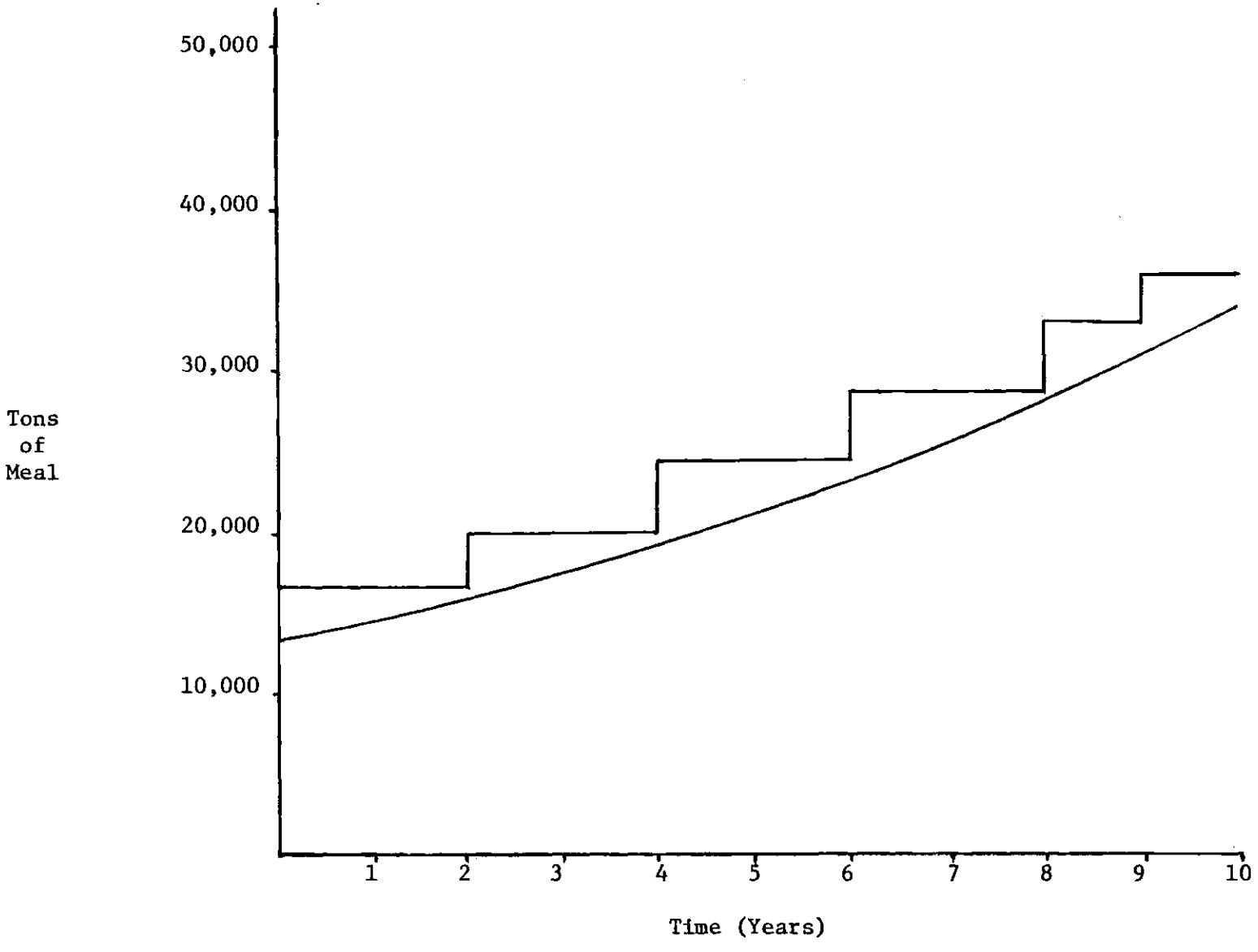

Figure 5-5. 10% Growth Rate - 100% Decision Rule

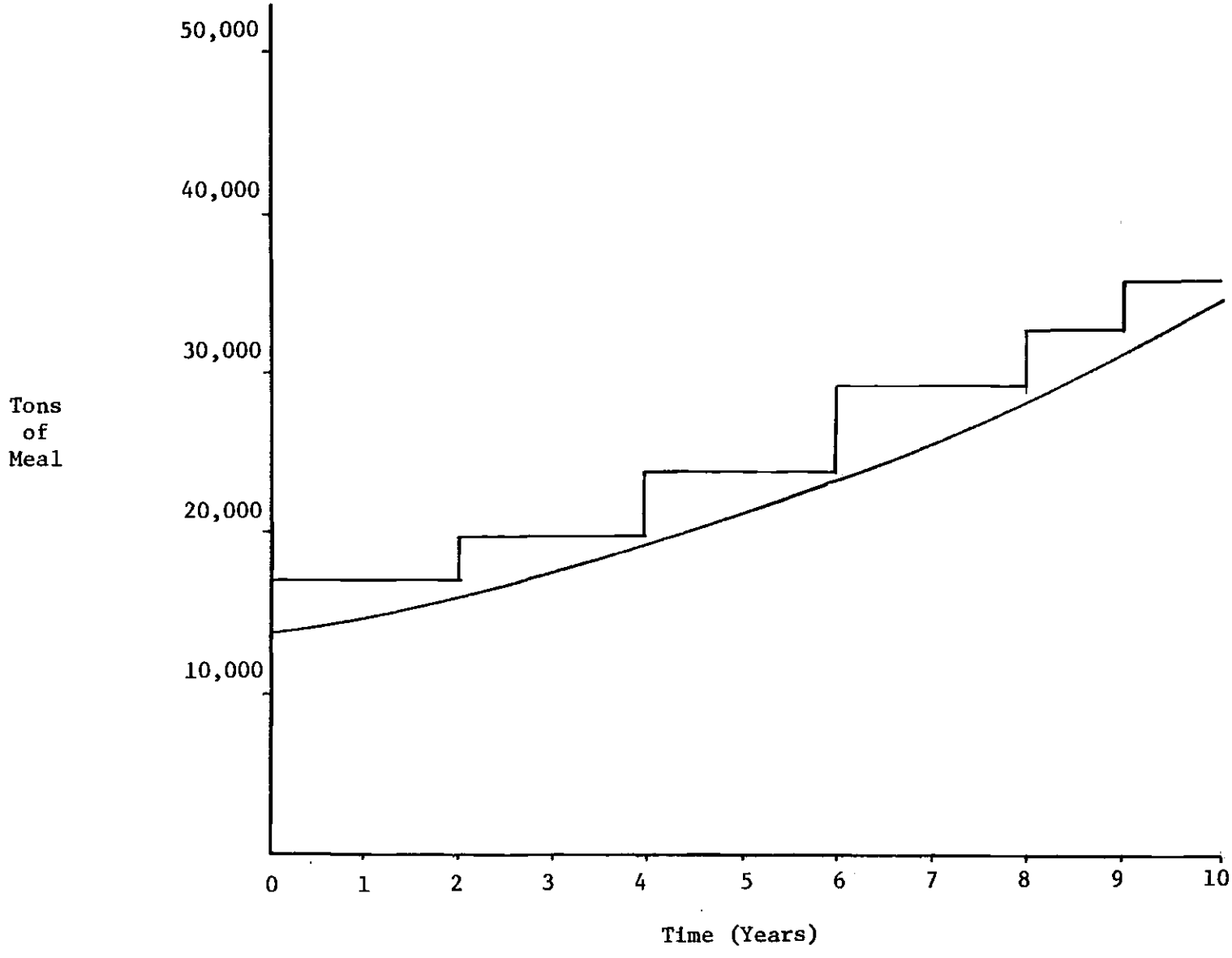

Figure 5-6. 10% Growth Rate - 150% Decision Rule

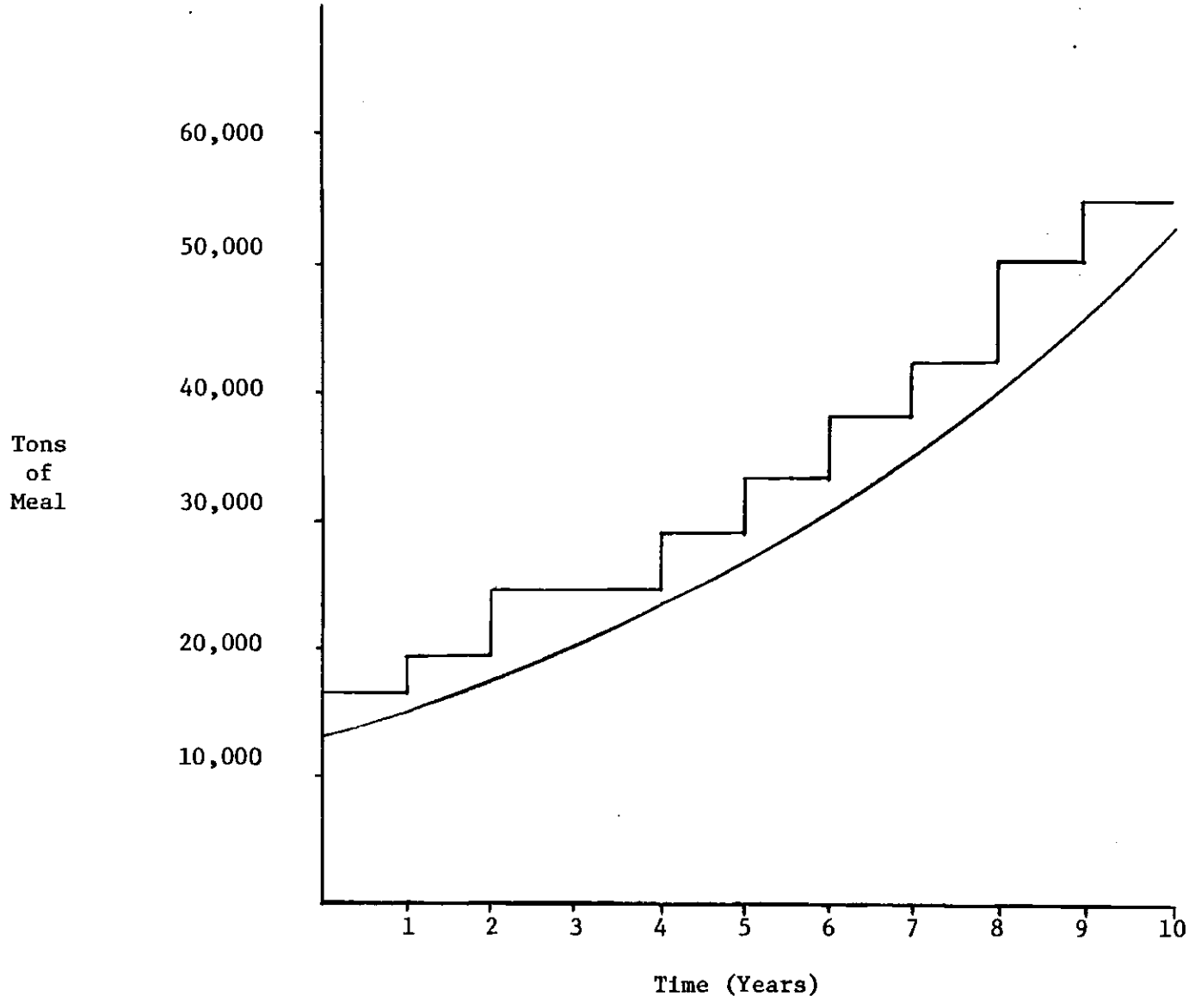

Figure 5-7. 15% Growth Rate - 100% Decision Rule

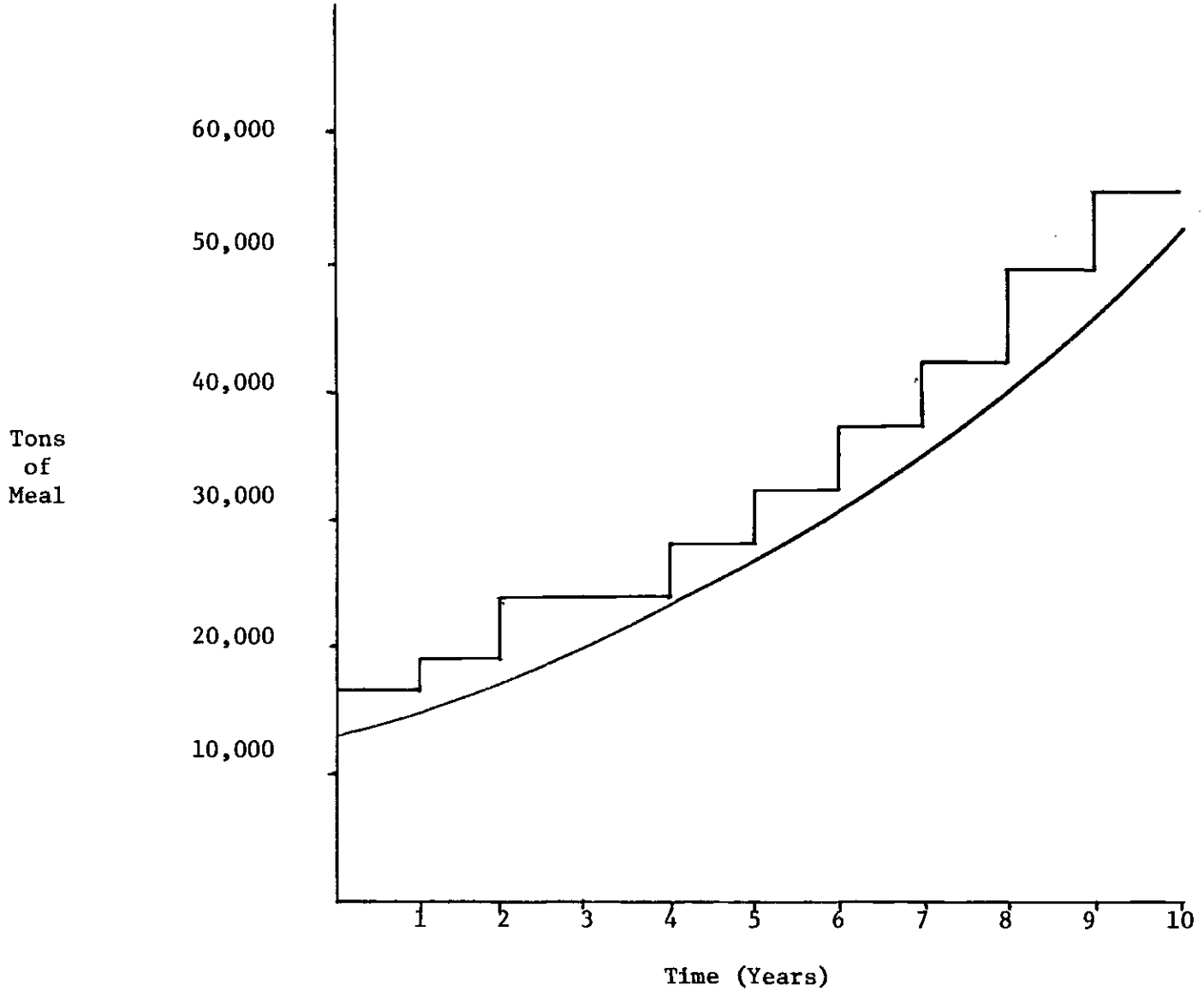

Figure 5-8. 15% Growth Rate - 150% Decision Rule

rules:

10% growth rate	-	100% decision rule,
10% growth rate	-	150% decision rule,
15% growth rate	-	100% decision rule, and
15% growth rate	-	150% decision rule.

All the increments were based upon the following convention: Increase plant capacity after one period whenever the fleet capacity exceeds 100% or 150% of the plant capacity.

5.2 Financial Analysis

Two very important financial statements were considered in this study: the income statement and the cash flow analysis. Additionally the present worth was calculated. The income statement provides a measure of the earnings performance of the firm for the period of time in which it was calculated. The revenues express the inflow of cash from selling the fish meal and fish oil. Expenses express the outflow of cash consumed in the process of generating the revenues. In the cash flow analysis, where cash receipts and disbursements were shown by year, no specific cash flow associated with depreciation expense is shown.

Both financial analyses are shown for the different growth rates and decision rules specified. Besides the two growth rates already specified, an additional analysis was made for zero-percent growth of the company.

Table A-2 (in Appendix) shows the different calculations for the income statement from which the cash flow analysis can be easily determined. The calculations are specified by year. The net sales were composed of two products, i.e., fish meal and fish oil, and the prices

utilized were as follows:

Fish Meal	=	280 U.S. Dollars (home market)
		467.2 U.S. Dollars (export)
Fish Oil	=	480 U.S. Dollars (home market)

An amount (specified by the company) of 2% is always assigned to the home market from the total amount of fish meal produced. For the fish oil the situation differs. All the production is sold in Ecuador where the price is always better than the one offered in foreign markets.

The cost of goods produced is calculated based on the wages and salaries, plant equipment depreciation, boats' depreciation, materials, plant supplies, boat supplies, other plant overhead, and other boat overhead.

Wages and salaries were divided in plant and boat respectively and the calculations for the plant wages and salaries were accomplished by making a relationship between the amount spent at present by the company and the amount of raw fish to be processed for the increment.

Calculations for the boat wages and salaries as well as the boat supplies and boat overhead require some explanation. In order to get the exact figures for the costs of operating the boats, a formula was developed which will not only represent the amount of fish caught in relation to the previous year but will estimate how the fleet operating costs vary according to the radius of the geographic area of fishing operations. This formula will tell us therefore how the cost has increased after the fleet capacity has been incremented in a given period of time. The formula consists of the following terms:

$$\text{Cost}_2 = \frac{\text{Boat Capacity}_2}{\text{Boat Capacity}_1} \left[\text{Total Boat Costs}_1 \frac{\text{Boat Capacity}_2}{\text{Boat Capacity}_1} \right]$$

where total boat cost$_2$ represents the total boat cost$_1$ (for example overhead, supplies or wages and salaries) during the period which represents the total cost involved during the last period before acquiring a new boat. Subscript 2 indicates the total capacity of the fleet during the period due to the increment in total boats.

The plant and equipment depreciation calculations were based upon the straight-line method with a 10% depreciation factor. Boats were also assigned a 10% depreciation factor. Materials, sacks, and containers were calculated directly based on the amount of fish meal and oil produced.

Plant supplies depended on the amount of raw fish processed. Plant overhead calculations were based on the 10% inflation rate and also on the amount of raw fish processed which involved increments in capacity causing overhead to rise. Boat overhead, besides being calculated using the formula indicated above, had a cost not specified by such an equation. That cost was insurance which was always calculated separately from the other overhead costs.

Sales expenses were accounted as 15% of total sales. Administrative salaries depended on the amount of tons processed and on the 10% inflation rate; however the amount of raw fish processed did not actually always create an additional increment on these salaries. Office equipment depreciation was always maintained at the same amount. Office overhead was figured using the same rationale as administrative salaries.

The following economic facts based on the Ecuadorian fishing law constitute an important factor for the development of the financial statement here explained:

1. Abonos Tributarios: These are incentives given by the government which permits companies such as Jambeli to deduct an amount equivalent to 7% of its fish meal sales and 11% of its fish oil sales from its income before taxes.

2. According to the labor premises of the country, the company is obliged to give to its employees an amount equal to 15% from its income before taxes.

3. Due to the investment or reinvestment, the company has planned that 50% of its income could be deducted for income tax purposes.

4. The following percentages must be applied for income taxes:

a.	Income Tax	20.0%	(Article 63 of Income Law)
b.	Highway Police	1.6%	(Article 71 of Income Law)
c.	Universities	2.2%	(Article 71 of Income Law)
	TOTAL	23.8%	

All the figures here shown are in complete accordance with the company's specifications.

The income statements given in Tables 5-7, 5-9, 5-11, 5-13, and 5-15 and the cash flow analysis given in Tables 5-8, 5-10, 5-12, 5-14, and 5-16 clearly indicate all the specifications and assumptions explained above. Both the income and cash flow analyses have shown different results for each of the given growth rates. At the 10% growth rate analysis, the 150% decision rule shows better results. However, the differences are not very significant. At the 15% growth rate the situation is not the same; here the 100% decision rule has shown better results than the 150% decision rule, but again the differences are not very significant.

One important factor which is probably the main reason for such differences is the price of the products. Throughout the entire analysis the price has been the same for all the ten years and each increment

Table 5-7. Income Statement for 10% Growth Rate

	Year 1	2	3	4
Net Sales:				
Meal	$7,523,201	$7,523,201	$9,249,840	$9,249,840
Oil	2,497,251	2,597,251	3,193,344	3,193,344
-Cost of Goods Produced:				
Wages & Salaries	408,469	449,316	686,029	754,632
Plant Equip.Depr.	55,000	55,000	55,000	55,000
Boats Depre.	130,000	130,000	164,485	164,485
Materials	215,673	237,201	302,804	333,084
Plant Supply	161,162	177,278	239,762	263,738
Boat Supply	128,447	141,292	222,089	244,298
Other Plant O.H.	166,327	182,960	201,256	221,382
Other Boat O.H.	289,615	318,577	466,578	513,236
=Gross Margin	$8,565,795	$8,428,828	$10,105,181	$9,893,329
-Selling & Admin. Expenses:				
Sales Expenses	1,518,068	1,669,875	1,866,478	2,053,126
Admin. Salaries	212,150	233,365	256,702	282,372
Ofc. Equip. Depr.	1,448	1,448	1,448	1,448
Other O.H.	20,186	22,205	24,425	26,868
=Net Op. Inc.	$6,813,943	$6,501,935	$ 7,956,128	$7,529,515
-Interest Exp.	88,891	---	---	---
-Employee Participation	1,008,758	975,290	1,193,419	1,129,427
-Other Deductions:				
Abonos Trib.	812,322	812,322	998,757	998,757
50% Inv/Reinv	2,451,986	2,347,162	2,881,976	2,700,666
=N.I. before Taxes	$2,451,986	$2,357,161	$2,881,976	$2,700,665
-Inc. Taxes	583,573	561,004	685,910	642,758
=Net. Inc.	$1,868,413	$1,796,157	$2,196,066	$2,057,907

and 100% Decision Rule

Year					
5	6	7	8	9	10
$11,469,804	$11,469,804	$13,566,432	$13,566,432	$15,416,400	$17,266,368
3,959,746	3,959,746	4,683,571	4,683,571	5,322,240	5,960,909
1,093,105	1,202,416	1,663,624	1,829,986	2,447,737	3,199,539
57,987	57,987	142,847	142,847	142,847	142,847
206,212	206,212	256,701	256,701	317,794	384,995
481,335	529,469	688,818	757,766	947,207	1,116,959
359,739	395,713	514,852	566,337	707,922	872,160
358,459	394,305	552,264	607,490	822,766	1,086,416
243,700	268,070	590,219	649,241	714,165	185,582
721,072	793,179	1,079,412	1,157,353	1,576,008	2,062,927
$11,907,941	$11,582,199	$12,761,206	$12,252,282	$13,062,194	$13,525,852
2,314,4433	2,545,876	2,737,500	3,011,250	3,110,796	3,484,091
310,608	341,669	432,212	475,433	522,976	575,274
1,448	1,448	1,448	1,448	1,448	1,448
29,555	32,511	71,523	78,675	86,543	95,197
$ 9,251,897	$ 8,660,695	$ 9,518,523	$ 8,685,476	$ 9,340,431	$ 9,369,842
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1,387,785	1,299,104	1,427,778	1,302,821	1,401,065	1,405,476
1,238,458	1,238,458	1,464,843	1,464,843	1,624,594	1,864,346
3,312,827	3,061,566	3,312,951	2,958,906	3,317,386	3,050,010
$ 3,312,827	$ 3,061,566	$ 3,312,951	$ 2,958,906	$ 3,137,386	$ 3,050,010
788,453	728,653	788,482	704,220	746,698	725,902
$ 2,524,374	$ 2,332,914	$ 2,524,465	$ 2,254,465	$ 2,390,688	$ 2,324,108

Table 5-8. Cash Flow Analysis for 10% Growth Rate

	Year 1	2	3	4
Cash Balance (BOP)	$713,626	$4,939,645	$10,091,734	$16,046,884
+Net Sales Revenue	10,120,452	10,120,452	12,443.184	12,443,184
-Operating Cash Outflow				
Wages & Salaries	620,619	682,681	942,731	1,037,004
Equip. Purchases	---	---	---	---
Boat Purchases	---	---	344,850	---
Material	215,637	237,201	302,804	333,084
Supply	289,609	318,570	461,851	508,036
Other O.H.	1,994,196	2,193,617	2,556,469	2,812,117
-Inc.Tax	583,573	561,004	685,910	642,758
-Employee Participation	1,008,758	975,290	1,193,419	1,129,427
+Funds Borrowed	---	---	---	---
-Debt Repaid	1,093,150	---	---	---
-Interest Exp.	88,891	---	---	---
=Cast Balance (EOP)	$4,939,645	$10,091,734	$16,046,884	$22,027,642

and 100% Decision Rule

Year					
5	6	7	8	9	10
$22,027,642	$28,921,811	$35,820,396	$42,170,161	$49,249,592	$56,293,426
15,429,550	15,429,550	18,250,003	18,250,003	20,738,640	23,272,277
1,403,713	1,544,085	2,095,836	2,305,419	2,970,713	3,774,413
29,868	---	848,599	---	---	---
417,269	---	504,895	---	610,923	672,015
481,335	529,469	688,878	757,766	947,207	1,166,959
718,195	790,018	1,067,116	1,173,827	1,540,688	1,958,576
3,308,760	3,639,636	4,478,654	4,926,519	5,487,512	6,427,797
788,453	728,653	788,428	704,220	746,698	725,902
1,387,785	1,299,104	1,427,778	1,302,821	1,401,065	1,401,065
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$28,921,811	$35,820,396	$42,170,161	$49,249,592	$56,293,426	$63,389,165

Table 5-9. Income Statement for 10% Growth Rate

	Year 1	2	3	4
Net Sales:				
Meal	$7,523,201	$7,523,201	$9,249,840	$9,249,840
Oil	2,597,251	2,597,251	3,103,344	3,193,344
-Cost of Goods Produced:				
Wages & Salaries	408,469	449,316	686.029	754,632
Plant Equip. Depr.	55,000	55,000	55,000	55,000
Boats Depr.	130,000	130,000	164,485	164,485
Materials	215,637	237,201	302,804	333,084
Plant Supply	161,162	177,278	239,762	263,738
Boat Supply	128,447	141,292	222,089	244,298
Other Plant O.H.	166,327	182,960	201,256	221,382
Other Boat O.H.	889,615	318,577	466,578	513,236
=Gross Margin	$8,565,795	$8,428,828	$10,105,181	$9,893,322
-Selling & Admin. Expenses:				
Sales Expenses	1,518,068	1,669,875	1,866,478	2,053,126
Admin. Expenses	212,150	233,365	256,702	282,372
Ofc. Equip. Depr.	1,448	1,448	1,448	1,448
Other O.H.	20,186	22,205	24,425	26,868
=Net Op. Inc.	$6,813,943	$6,501,935	$ 7,956,128	$7,529,515
-Interest Exp.	88,891	---	---	---
-Employee Participation:	1,008,758	975,290	1,193,419	1,129,427
-Other Deductions:				
Abon. Trib.	812,322	812,322	998,757	998,757
50% Inv/Reinv.	2,451,986	2,357,162	2,881,976	2,700,666
=N.I. before Taxes	$2,451,986	$2,357,162	$2,881,976	$2,700,666
-Inc. Taxes	583,573	561,004	685,910	642,758
=Net Inc.	$1,868,413	$1,796,157	$2,196,066	$2,057,907

and 150% Decision Rule

Year					
5	6	7	8	9	10
$11,087,476	$11,087,476	$13,412,269	$13,412,269	$15,169,741	$16,649,712
3,827,755	3,827,755	4,630,349	4,630,349	5,237,083	5,748,019
1,086,869	1,195,556	1,660,582	1,826,640	2,441,847	3,183,340
55,000	55,000	58,614	58,614	58,614	58,614
206,212	206,212	256,701	256,701	317,794	384,995
465,290	511,819	681,050	749,155	932,052	1,125,282
347,748	382,523	509,002	559,902	696,595	841,011
358,459	394,305	552,264	607,490	822,766	1,086,416
243,504	267,854	294,877	324,365	356,802	392,482
721,072	793,179	1,079,412	1,187,353	1,576,008	2,062,927
$11,431,077	$11,108,783	$12,950,116	$12,472,398	$13,204,346	$13,262,664
2,237,285	2,461,014	2,706,393	2,977,032	3,061,024	3,359,660
310,508	341,669	375,836	413,420	454,762	500,238
1,448	1,448	1,448	1,448	1,448	1,448
29,555	32,511	35,761	39,337	43,271	47,598
$8,852,181	$8,272,141	$9,830,678	$9,041,161	$9,643,841	$9,353,720
---	---	---	---	---	---
1,327,827	1,240,821	1,474,602	1,356,174	1,446,576	1,403,058
1,197,176	1,197,176	1,448,197	1,448,197	1,637,961	1,797,762
3,163,589	2,517,072	3,453,940	3,118,035	3,279,652	3,076,450
$3,163,589	$2,917,072	$3,453,940	$3,118,035	$3,279,651	$3,076,450
752,934	694,263	827,038	742,092	780,557	732,195
$2,410,655	$2,222,809	$2,631,902	$2,375,943	$2,499,095	$2,344,255

Table 5-10. Cash Flow Analysis for 10% Growth Rate

	Year			
	1	2	3	4
Cash Balance (BOP)	$713,626	$4,939,645	$10,091,734	$16,046,884
+Net Sales Revenue	10,120,452	10,120,452	12,443,184	12,443,184
-Operating Cash Outflow:				
Wages & Salaries	620,619	682,681	942,731	1,037,004
Equip. Purchases	---	---	---	---
Boat Purchases	---	---	344,850	---
Material	215,637	237,201	302,804	333,084
Supply	289,609	318,570	461,851	508,036
Other O.H.	1,994,196	2,193,617	2,556,469	2,812,117
-Inc. Tax Payments	583,573	561,004	685,910	642,758
-Employee Participation	1,008,758	975,290	1,193,419	1,129,427
+Funds Borrowed	---	---	---	---
-Debt Repaid	1,093,150	---	---	---
-Interest Exp.	88,891	---	---	---
=Cash Balance(EOP)	$4,939,645	$10,091,734	$16,046,884	$22,027,642

and 150% Decision Rule

Year					
5	6	7	8	9	10
$22,027,642	$28,644,453	$35,244,170	$42,553,936	$49,813,594	$56,997,235
14,915,231	14,915,231	18,042,618	18,042,618	20,406,824	22,397,731
1,397,477	1,537,225	2,036,418	2,240,060	2,896,609	3,683,578
---	---	36,140	---	---	---
417,269	---	504,895	---	610,923	672,015
465,290	511,819	681,050	749,155	932,052	1,125,282
706,207	776,828	1,061,266	1,167,392	1,519,361	1,927,427
3,231,416	3,554,558	4,116,443	4,528,887	5,037,105	5,862,667
752,934	694,263	822,038	742,092	780,557	732,195
1,327,827	1,240,821	1,474,602	1,356,174	1,446,576	1,403,058
---	---	---	---	---	---
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$28,644,453	$35,244,170	$42,553,936	$49,813,594	$56,997,235	$63,988,744

Table 5-11. Income Statement for 15% Growth Rate

	Year 1	Year 2	Year 3	Year 4
Net Sales:				
Meal	$7,523,201	$9,249,840	$11,469,804	$11,469,804
Oil	2,597,251	3,193,344	3,959,746	3,959,746
-Cost of Goods Produced:				
Wages & Salaries	408,469	623,662	903,393	993,732
Plant Equip. Depr.	55,000	55,000	57,468	57,468
Boats Depr.	130,000	161,350	195,835	195,835
Materials	215,637	291,640	397,797	437,577
Plant Supply	161,162	217,966	297,305	327,036
Boat Supply	128,447	201,899	296,247	325,872
Other Plant O.H.	166,327	182,960	201,435	221,579
Other Boat O.H.	289,615	430,054	608,255	669,081
=Gross Margin	$8,565,795	$10,278,653	$12,471,815	$12,201,370
-Selling & Admin. Expenses:				
Sales Expenses	1,518,068	1,866,478	2,314,433	2,545,876
Admin. Expenses	212,150	233,365	256,701	282,371
Ofc. Equip. Depr.	1,448	1,448	1,448	1,448
Other O.H.	20,186	22,205	24,425	26,868
=Net.Op. Inc.	$6,813,943	$8,155,157	$9,874,808	$9,344,807
-Interest Exp.	88,891	---	---	---
-Employee Participation:	1,008,758	1,223,274	1,481,221	1,401,721
-Other Deductions:				
Abon. Trib.	812,322	998,757	1,238,458	1,238,458
50% Inv./Reinv.	2,451,986	2,966,563	3,577,564	3,352,314
=N.I. before Taxes	$2,451,986	$2,966,563	$3,577,564	$3,352,314
-Inc. Taxes	583,573	706,042	851,460	797,851
=Net. Inc.	$1,868,413	$2,260,521	$2,726,104	$2,554,463

and 100% Decision Rule

Year					
5	6	7	8	9	10
$13,566,432	$15,416,400	$17,266,368	$19,702,159	$23,186,266	$25,652,890
4,683,721	5,322,240	5,960,909	6,801,821	8,004,648	8,856,206
1,374,896	1,839,021	2,403,861	3,098,387	4,443,060	5,511,134
127,601	127,601	127,601	127,601	131,973	131,973
237,562	283,461	333,951	389,489	511,674	578,875
569,320	711,651	876,754	1,100,482	1,424,599	1,660,675
425,498	531,872	655,267	822,477	1,064,715	1,295,780
456,417	618,156	816,241	1,056,619	1,538,785	1,913,815
487,856	536,642	590,306	649,336	714,510	785,961
904,404	1,204,883	1,570,713	2,012,482	2,902,694	3,584,558
$13,666,449	$14,852,583	$15,852,583	$17,247,107	$18,458,904	$19,046,325
2,737,500	3,110,796	3,484,092	3,975,597	4,678,637	5,176,365
357,200	392,920	432,212	475,433	522,976	575,274
1,448	1,448	1,448	1,448	1,448	1,448
59,109	65,020	71,521	78,674	86,541	95,195
$10,511,192	$ 1,314,169	$11,863,310	$12,715,955	$13,169,302	$13,198,043
---	---	---	---	---	---
1,576,679	1,697,275	1,779,497	1,907,393	1,975,395	1,979,706
1,464,843	1,664,594	1,864,346	2,127,351	2,503,550	2,769,885
3,734,835	3,976,650	4,109,734	4,340,605	4,345,178	4,224,885
$3,734,835	$3,976,650	$4,109,734	$4,340,606	$4,340,605	$4,224,226
888,891	946,443	978,117	1,033,064	1,034,152	1,005,366
$2,845,944	$3,030,207	$3,131,617	$3,307,541	$3,311,026	$3,218,860

Table 5-12. Cash Flow Analysis for 15% Growth Rate

	Year 1	2	3	4
Cash Balance (BOP)	$713,626	$4,939,645	$11,069,784	$18,497,128
+ Net Sales Revenue	10,120,452	13,443,184	15,429,550	15,429,550
- Operating Cash Outflow:				
Wages & Salaries	620,619	857,027	1,160,094	1,276,103
Equip, Purchases	---	---	24,684	---
Boat Pruchases	---	313,500	344,850	---
Material	215,637	291,640	397,797	437,577
Supply	289,609	419,865	593,552	652,908
Other O.H.	1,994,196	2,501,697	3,148,548	3,463,404
- Inc. Tax	583,573	706,042	851,460	797,851
- Employee Participation	1,008,758	1,223,274	1,481,221	1,401,721
+ Funds Borrowed	---	---	---	---
- Debt Repaid	1,093,150	---	---	---
- Interest Exp.	88,891	---	---	---
= Cash Balance (EOP)	$4,939,645	$11,069,784	$18,497,128	$25,897,114

and 100% Decision Rule

Year					
5	6	7	8	9	10
$25,897,114	$33,190,757	$41,815,723	$50,879,524	$60,618,176	$70,157,451
18,250,003	20,738,640	23,227,277	26,503,980	31,190,914	34,509,096
1,732,096	2,231,941	2,836,073	3,573,820	4,966,036	6,086,408
701,321	---	---	---	43,729	---
417,269	458,995	504,895	555,384	1,221,846	672,015
569,320	711,651	876,754	1,100,482	1,424,599	1,660,675
881,915	1,150,028	1,471,508	1,879,096	2,603,500	3,209,595
4,188,869	4,917,341	5,716,632	6,716,089	8,382,382	9,642,079
888,891	946,443	978,117	1,033,064	1,034,152	1,005,366
1,576,679	1,697,275	1,779,497	1,907,393	1,975,395	1,979,706
---	---	---	---	---	---
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$33,190,757	$41,815,723	$50,879,524	$60,181,176	$70,157,451	$30,107,703

Table 5-13. Income Statement for 15% Growth Rate

	Year 1	Year 2	Year 3	Year 4
Net Sales:				
Meal	$7,523,201	$9,249,840	$11,087,476	$11,087,476
Oil	2,597,251	3,193,344	3,827,755	3,827,755
-Cost of Goods Produced:				
Wages & Salaries	408,469	623,662	898,239	988,063
Plant Equip. Depr.	55,000	55,000	55,000	55,000
Boats Depr.	130,000	161,350	195,835	195,835
Materials	215,637	291,640	384,537	422,991
Plant Supply	161,162	217,966	287,395	316,135
Boat Supply	128,447	201,899	296,247	325,872
Other Plant O.H.	166,327	182,960	201,256	221,382
Other Boat O.H.	289,615	430,054	608,255	669,081
=Gross Margin	$8,565,795	$10,278,653	$11,988,467	$11,720,872
-Selling & Admin. Expenses:				
Sales Expense	1,518,068	1,866,478	2,237,285	2,461,014
Admin. Expenses	212,150	233,365	256,701	282,371
Ofc. Equip. Depr.	1,448	1,448	1,448	1,448
Other O.H.	20,186	22,205	24,425	26,868
=Net. Op. Inc.	$6,813,943	$8,155,157	$9,468,608	$8,949,171
-Interest Exp.	88,891	---	---	---
-Employee Participation	1,008,758	1,223,274	1,420,291	1,342,376
-Other Deductions:				
Abon. Trib.	812,322	998,757	1,197,176	1,197,176
50% Inv/Reinv.	2,451,986	2,966,563	3,425,570	3,204,810
=N.I. before Taxes	$2,451,986	$2,966,563	$3,425,570	$3,204,810
-Inc. Taxes	583,573	706,042	815,286	762,745
=Net Inc.	$1,868,413	$2,260,521	$2,610,285	$2,442,065

and 150% Decision Rule

Year					
5	6	7	8	9	10
$13,412,268	$15,169,740	$16,649,712	$19,702,159	$23,124,601	$26,516,209
4,630,349	5,237,023	5,748,019	6,801,821	7,983,360	9,154,253
1,372,382	1,834,596	2,391,690	3,098,387	4,441,587	6,115,210
57,987	57,987	57,987	151,333	151,333	151,333
237,562	283,461	333,951	389,489	511,674	646,077
562,851	700,264	845,441	1,100,482	1,420,810	1,792,115
420,663	532,362	631,864	822,477	1,061,883	2,143,839
456,417	618,156	816,241	1,056,619	1,538,785	2,143,839
243,700	268,070	294,877	649,241	714,165	785,582
904,404	1,204,883	1,570,713	2,012,482	2,902,694	4,012,624
$13,786,651	$14,916,044	$15,454,967	$17,223,470	$18,365,030	$18,684,294
2,706,393	3,061,023	3,349,660	3,975,597	4,666,194	5,350,569
310,608	341,669	375,836	474,433	522,976	575,274
1,448	1,448	1,448	1,448	1,448	1,448
29,554	32,510	35,761	78,674	86,541	95,195
$10,738,648	$11,479,394	$11,682,262	$12,692,318	$13,087,871	$12,661,808
---	---	---	---	---	---
1,610,797	1,721,909	1,752,339	1,903,847	1,963,181	1,899,271
1,448,197	1,637,961	1,797,762	2,127,351	2,496,892	2,863,102
3,839,827	4,059,762	4,066,080	4,330,560	4,313,899	3,949,717
$3,839,827	$4,059,762	$4,066,080	$4,330,560	$4,313,899	$3,949,717
913,879	966,223	967,727	1,030,673	1,026,708	940,033
$2,925,948	$3,093,539	$3,098,353	$3,299,886	$3,287,191	$3,009,685

Table 5-14. Cash Flow Analysis for 15% Growth Rate

	Year 1	2	3	4
Cash Balance (BOP)	$713,626	$4,939,645	$11,069,784	$18,210,248
+Net Sales Revenue	10,120,452	12,443,184	14,915,231	14,915,231
-Operating Cash Outflow:				
Wages & Salaries	620,619	857,027	1,154,940	1 270,434
Equip, Purchases	---	---	---	---
Boat Purchases	---	313,500	344,850	---
Material	215,637	291,640	384,537	422,991
Supply	289,609	419,865	583,642	642,007
Other O.H.	1,994,196	2,501,697	3,071,221	3,378,345
-Income Tax	583,573	706,042	815,286	762,745
-Employee Participation	1,008,758	1,223,274	1,420,291	1,342,376
+Funds Borrowed	---	---	---	---
-Debt Repaid	1,093,150	---	---	---
-Interest Exp.	88,891	---	---	---
=Cash Balance (EOP)	$4,939,645	$11,069,784	$18,210,248	$25.306,581

and 150% Decision Rule

Year					
5	6	7	8	9	10
$25,306,581	$33,370,120	$42,045,283	$50,895,970	$59,707,195	$69,247,786
18,042,617	20,406,823	22,397,731	26,503,980	31,107,961	35,670,462
1,682,990	2,176,265	2,767,526	3,572,820	4,964,563	6,690,484
29,868	---	---	933,459	---	---
417,562	458,995	504,895	555,384	1,221,846	1,344,030
562,851	700,264	845,441	1,100,482	1,420,810	1,792,115
877,080	1,141,518	1,448,105	1,878,096	2,600,668	3,483,227
3,884,051	4,566,486	5,261,011	6,715,994	8,369,594	10,243,970
913,879	966,223	967,727	1,030,673	1,026,708	940,033
1,610,797	1,721,909	1,752,339	1,903,847	1,963,181	1,899,271
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$33,370,120	$42,045,283	$50,895,970	$59,707,195	$69,24-,786	$78,525,118

Table 5-15. Income Statement

	Year 1	2	3	4
Net Sales:				
Meal	$7,523,201	$7,523,201	$7,523,201	$7,523,201
Oil	2,597,251	2,597,251	2,597,251	2,597,251
-Cost of Goods Produced:				
Wages & Salaries	408,469	449,316	494,248	543,672
Plant Equip. Depr.	55,000	55,000	55,000	55,000
Boats Depr.	130,000	130,000	130,000	130,000
Materials	215,637	237,201	260,921	287,013
Plant Supply	161,162	177,278	195,006	214,507
Boat Supply	128,447	141,292	155,421	170,963
Other Plant. O.H.	166,327	182,960	201,256	221,381
Other Boat O.H.	289,615	318,577	350,434	385,478
=Gross Margin	$8,565,795	$8,428,828	$8,278,166	$8,112,438
-Selling & Admin. Expenses:				
Sales Expenses	1,518,068	1,669,875	1,836,862	2,020,549
Admin. Expenses	212,150	233,365	256,702	282,372
Ofc. Equip. Depr.	1,448	1,448	1,448	1,448
Other O.H.	20,186	22,205	24,425	26,868
=Net Op. Inc.	$6,813,943	$6,501,935	$6,158,729	$5,781,201
-Interest Exp.	88,891	---	---	---
-Employee Participation	1,008,758	975,290	923,809	867,180
Other Deductions:				
Abon. Trib.	812,322	812,322	812,322	812,322
50% Inv/Reinv.	-----	---	---	---
=N.I. before Taxes	$4,903,972	$4,714,323	$4,422,598	$4,101,699
-Inc. Taxes	1,167,145	1,122,009	1,052,578	976,204
=Net. Inc.	$3,736,827	$3,592,314	$3,370,019	$3,125,494

for 0% Growth Rate

Year					
5	6	7	8	9	10
$7,432.201	$7,523,201	$7,523,201	$7,523,201	$7,523,201	$7,523,201
2;597,251	2,597,251	2,597,251	2,597,251	2,597,251	2,597,251
598,040	657,843	723,628	795,991	875,590	963,149
55,000	55,000	55,000	55,000	55,000	55,000
130,000	130,000	130,000	130,000	130,000	130,000
315,714	347,286	382,014	420,216	462,237	508,461
235,957	259,553	285,508	314,059	345,465	380,012
188,059	206,865	227,552	250,307	275,338	302,871
243,519	267,871	294,658	324,124	356,537	392,190
424,025	466,428	513,071	564,378	620,815	682,897
$7,930,138	$7,729,606	$7,509,021	$7,266,377	$6,999,470	$6,705,872
2,222,603	2,444,864	2,689,350	2,958,285	3,254,114	3,569,525
310,609	341,670	375,837	413,420	454,762	500,239
1,448	1,448	1,448	1,448	1,448	1,448
29,554	32,510	35,761	39,337	43,270	47,598
$5,365,924	$4,909,114	$4,406,625	$3,853,887	$3,245,876	$2,577,062
---	---	---	---	---	---
804,889	736,367	660,994	578,083	485,881	386,559
812,322	812,322	812,322	812,322	812,322	812,322
---	---	---	---	---	---
$3,748,713	$3,360,425	$2,933,309	$2,463,482	$1,946,673	$1,378,181
892,194	799,781	698,128	586,309	463,308	328,007
$2,856,520	$2,560,644	$2,235,182	$1,877,173	$1,483,365	$1,050,174

Table 5-16. Cash Flow Analysis

	Year			
	1	2	3	4
Cash Balance (BOP)	$713,626	$4,356,073	$8,947,158	$13,315,949
+Net Sales Revenue	10,120,452	10,120,452	10,120,452	10,120,452
-Operating Cash Outflows:				
Wages & Salaries	620,619	682,681	750,949	826,044
Equip, Purchases	---	---	---	---
Boat Purchases	---	---	---	---
Material	215,637	237,201	260,921	287,013
Supply	289,609	318,570	350,427	385,275
Other O.H.	1,994,196	2,193,616	2,412,977	2,654,275
-Income Tax	1,167,145	1,122,009	1,052,578	976,204
-Employee Participation	1,008,758	975,290	923,809	867,180
+Funds Borrowed	---	---	---	---
-Debt Repaid	1,093,150	---	---	---
-Interest Exp.	88,891	---	---	---
=Cash Balance (EOP)	$4,356,073	$8,947,158	$13,315,949	$17,440,215

for 0% Growth Rate

Year					
5	6	7	8	9	10
$17,440,215	$21,955,503	$24,854,917	$28,088,869	$30,964,812	$33,446,947
10,120,402	10,120,452	10,120,452	10,120,452	10,120,452	10,120,452
808,648	999,513	1,099,464	1,209,411	1,330,352	1,463,387
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315,714	347,286	382,014	420,216	462,237	508,451
424,017	466,418	513,060	564,366	620,803	682,883
2,919,702	3,211,673	3,532,840	3,886,124	4,274,736	4,702,210
892,194	799,781	698,128	586,309	463,308	328,007
804,889	736,367	660,994	578,083	486,881	386,559
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$21,295,503	$24,854,917	$28,088,869	$30,964,812	$33,446,947	$35,495,892

in the growth rate signifies more costs involved which were not answered with a price increase.

5.2.1. Present-Worth Analysis

This analysis was based on all the different cash flows with a 10-percent interest rate factor, where

$$= PW_{\text{factor 1}} (\text{Cash Balance}_{\text{ending}} - \text{Cash Balance}_{\text{begin}})$$

$$+ \ldots + PW_{\text{factor 10}} (\text{Cash Balance}_{\text{ending}} - \text{Cash Balance}_{\text{begin}})$$

A. 0-percent growth rate

PW = $22,452,102.

B. 10-percent growth rate

1. 100 percent decision rule
   PW = $37,118,539.

2. 150 percent decision rule
   PW = $37,373,466.

C. 15-percent growth rate

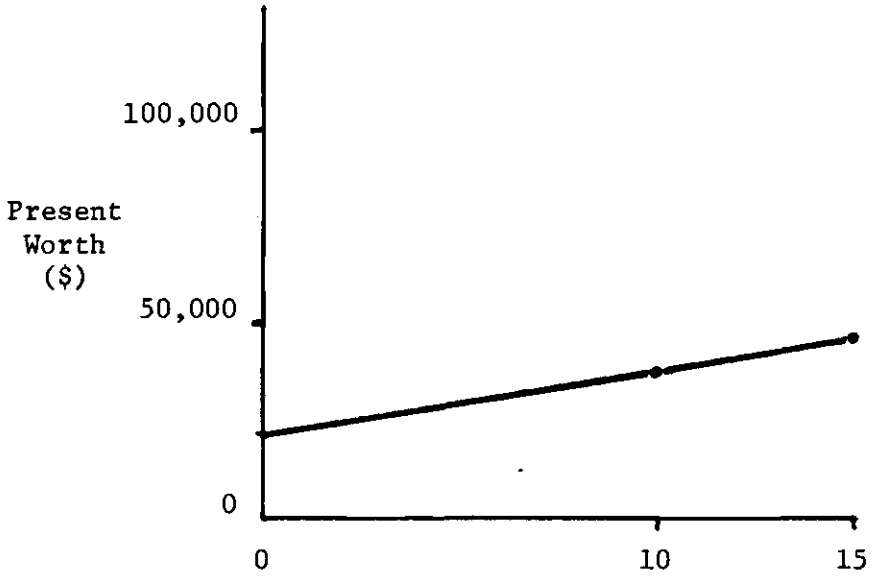
1. 100 percent decision rule
   PW = $46,134,088.

2. 150 percent decision rule
   PW = $45,299,754.

The present-worth analysis has shown that for a 10-percent growth rate the best decision is to take the 150 percent decision rule, while for a 15-percent rate it is the 100 percent decision rule which should be undertaken. It should be noted, however, that the difference in present worth is very small.

The 15-percent growth rate shows better results, but this is not a fact in order to stipulate that any higher growth rate will actually

100% Decision Rule



150% Decision Rule

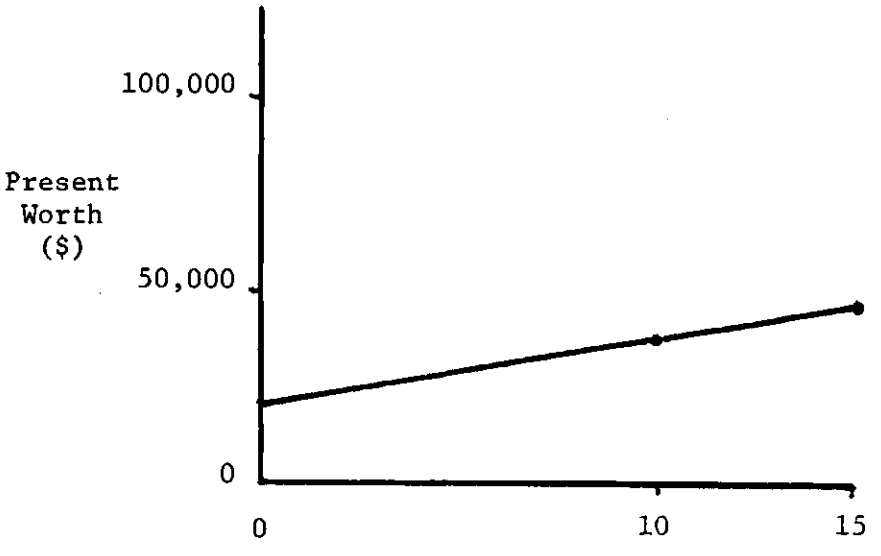


Figure 5-9. Present Worth Curves

represent better results because if the company tries to exceed the 1% market share, based on its relationship to the world fish meal production, market conditions could change one way or another. Consequently, a careful economic analysis is recommended before the company expects to be a main competitor in the world fish meal market.

The results of the study indicate that the expansion policy of the company should be to grow as rapidly as government regulations will permit subject to the availability of fish and adverse world market conditions.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Before going into an expansion implementation it is suggested that the price factor should be always considered as of primary importance. It is this one factor which reigns above all the others when any kind of projections and analysis are to be considered.

The approach here used for the analysis and study of the expansion plan might not be the optimum way to represent it, but it does show a logical sequence of factors and assumptions that could be applied to any other fish meal expansion analysis whenever the time presents itself.

It is recommended that the fish meal industry in Ecuador not expand until a complete ecological impact study is made and positive results are obtained. Even if the study is made, many factors are still unpredictable. The most recent example of this was experienced on the California coast when the sardine industry suffered an unexpected scarcity which was totally unforeseen. The study might take some time but in the future it will be compensated.

Considering the Peruvian fishing failure and its consequent loss of the world market, other Latin American countries have had to develop faster in order to supply those international markets asking for fish meal. However, the situation is not simple due to such important factors as the limited sea boundaries for nations such as Ecuador.

APPENDIX

Table A-1. Ton-Day Accumulation

Ton	Day (Total)	Fleet Capacity	Ton/Fleet Capacity
80	2	250	.32
50	1	250	.20
70.5	1	250	.28
210.5	1	250	.84
137.5	1	250	.55
117.5	1	250	.47
121.5	1	250	.49
122.5	1	250	.49
99.5	1	250	.80
152.5	1	250	.61
191.5	1	250	.77
208.5	1	250	.83
185.5	1	250	.74
169.5	1	250	.68
145.5	1	250	.58
163.5	1	250	.65
278.5	1	670	.42
273.5	1	670	.41
282.5	1	670	.42
322.5	1	670	.48
570.5	1	670	.85
640.5	1	670	.96
618.5	1	670	.92
646.5	1	670	.96
406.5	1	670	.61
532.5	1	670	.79
593.5	1	670	.89
499.5	1	670	.75
315.5	1	670	.47
613.5	1	670	.92
573.5	1	670	.86
399.5	1	670	.60
323.5	1	670	.48
387.5	1	670	.58
345.5	1	670	.52
586.5	1	670	.88
599.5	1	670	.89
584.5	1	670	.87
425.5	1	670	.64
70	2	250	.28
74	1	250	.30
86	1	250	.34
93	2	250	.37

Table A-1. Ton-Day Accumulation (Continued)

Ton	Day (Total)	Fleet Capacity	Ton/Fleet Capacity
99	1	250	.40
98	2	250	.39
97	1	250	.39
91	1	670	.14
100	6	250	.40
190	1	250	.76
135	1	250	.54
120	2	250	.48
185	1	250	.74
186	1	250	.74
142	1	250	.57
115	1	250	.46
117	1	250	.47
133	1	250	.53
150	1	250	.60
175	1	250	.70
109	1	250	.44
111	1	250	.44
165	1	250	.66
182	1	250	.73
172	1	250	.69
199	1	250	.80
183	1	250	.73
173	1	250	.69
174	1	250	.70
167	1	250	.67
188	1	250	.75
127	1	250	.51
124	1	670	.19
200	1	250	.80
210	1	250	.84
225	1	670	.34
239	1	670	.36
205	1	670	.31
253	1	670	.38
273	2	670	.41
278	1	670	.41
235	1	670	.35
212	1	670	.32
202	1	670	.30
231	1	670	.34
230	1	670	.34
298	1	670	.44
274	1	670	.41
306	1	670	.46
385	2	670	.57

Table A-1, Ton-Day Accumulation (Continued)

Ton	Day (Total)	Fleet Capacity	Ton/Fleet Capacity
320	1	670	.48
328	1	670	.49
322	1	670	.48
325	1	670	.89
380	1	670	.57
351	1	670	.52
300	1	670	.45
445	1	670	.66
402	1	670	.60
428	1	670	.64
420	2	670	.63
433	2	670	.65
480	3	670	.72
460	1	670	.69
408	1	670	.61
499	1	670	.74
424	1	670	.63
444	1	670	.66
404	1	670	.60
422	1	670	.63
405	1	670	.60
425	1	670	.63
421	1	670	.63
450	1	670	.67
489	1	670	.73
411	1	670	.61
400	1	670	.60
401	1	670	.60
591	2	670	.88
595	1	670	.89
509	1	670	.76
500	1	670	.75
598	1	670	.89
596	1	670	.89
577	1	670	.86
520	1	670	.78
579	1	670	.86
534	1	670	.80
582	1	670	.87
526	1	670	.79
573	1	670	.86
594	1	670	.89
652	2	670	.97
630	2	670	.94
610	1	670	.91
644	1	670	.96

Table A-1. Ton-Day Accumulation (Continued)

Ton	Day (Total)	Fleet Capacity	Ton/Fleet Capacity
600	1	670	.90
602	1	670	.90
623	1	670	.93
615	1	670	.92
604	1	670	.90
637	1	670	.95
641	1	670	.96
655	1	670	.98
628	1	670	.94
659	1	670	.98
624.8	1	670	.93

Table A-2. Income Statement Calculations

I. 10% Growth Rate
100% Decision Rule

First Year

A. Net Sales:

Fish Meal	16,232.83 T	
	324.66 T x $280.00	$ 90,903.87
	15,908.17 T x $467.20	$7,432,297.02
		$7,523,200.89
Fish Oil	5,410.94 T x $480.00	$2,597,251.20

B. Cost of Goods Produced:

Wages and Salaries

Plant	$69,185.25 -- 55,832.3 T	
	X -- 67,636.8 T	
	X =	$ 83,812.93
Boat		$ 324,656.64
		$ 408,469.57
Plant Equipment Depreciation ($550,000 x 10%)		$ 55,000.00
Boats Depreciation ($1,300,000 x 10%)		$ 130,000.00
Materials		
Sacks		$ 115,636.86
Containers		$ 100,000.00
		$ 215,636.86
Plant Supplies ($4,029,060.04 ÷ 25)		$ 161,162.40
Boat Supplies		
$535,196.93 x 6 = $3,211,181.57 ÷ 25		$ 128,447.26
Plant Overhead		
$2,751,845.10 + $250,970.42 +		
$1,155,099.00 + $262.16 = $4,158,176.68 ÷ 25		$ 166,327.07
Boat Overhead		
Insurance		$ 64,800.00
Fuel		$ 86,400.00
Maintenance and Repair		$ 138,415.50
		$ 239,614.50

Table A-2. Income Statement Calculations (Continued)

C. Selling and Administrative Expenses:

Sales Expenses	$ 1,518,067.81
Administrative Salaries	$ 212,149.71
Office Quipment Depreciation	$ 1,446.93
Other Overhead	$ 20,186.00

D. Interest on Borrowed Funds $ 88,891.00
Taxes $ 583,573.00
Abonos Tributarios $ 812,321.69

Second Year

A 10% increment has been given to all the different costs with exception of Sales and Depreciation.

Taxes	$ 561,004.00
Abonos Tributarios	$ 812,322.00

Third Year

A. Net Sales:

Fish Meal 19,958.40 T

399.17 T x $280.00	$ 111,767.04
19,599.23 T x $467.20	$ 9,138.073.19
	$ 9,249,840.23

Fish Oil 6,652.80 T x $480.00 $ 3,193,344.00

B. Cost of Goods Produced:

Wages and Salaries

Plant $101,413.65 -- 67,636.8 T
X -- 83,160.0 T
X = $ 124,688.91

Boat 850/670 (392,834.33 $\sqrt{850/670}$) $ 561,339.81
$ 686,028.72

Plant Equipment Depreciation $ 55,000.00

Boats Depreciation ($130,000.00 + $34,485.00) $ 164,485.00

Table A-2. Income Statement Calculations (Continued)

Materials

$139,920.60	--	16,232.83 T			
X	--	19,958.40 T			
			X =	$	172,033.55
$121,000.00	--	5,410.94 T			
Y	--	6,652.80 T			
			Y =	$	148,770.70
			X + Y =	$	302,804.15

Plant Supplies

$195,006.50	--	67,636.8 T			
X	--	83,160.0 T			
			X =	$	239,762.10

Boat Supplies

850/670 ($155,421.19 $\sqrt{850/670}$) $ 222,088.67

Plant Overhead $ 201,255.75

Boat Overhead

850/670 ($272,025.55 $\sqrt{850/670}$)
$388,710.14 + [$64,800 + $13,068] $ 466,578.14

C. Selling and Administrative Expenses:

Sales Expenses	$ 1,866,477.64
Administrative Salaries	$ 256,702.00
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 24,425.00

D. Taxes $ 685,910.00
Abonos Tributarios $ 998,756.64

Fourth Year

A 10% increment has been given to all the different costs with exception of Sales and Depreciation.

Taxes	$ 642,758.00
Abonos Tributarios	$ 998,756.64

Fifth Year

A. Net Sales:

Fish Meal 24,748.42 T

494.97 T x $280.00	$ 138,591.15
24,253.45 T x $467.20	$11,331.212.59
	$11,469,802.74

Table A-2. Income Statement Calculations (Continued)

Fish Oil	8,249.47 T x $480.00		$ 3,959,745.60
B. Cost of Goods Produced:			
Wages and Salaries			
Plant	$150,873.58 -- 83,160.00 T		
	X -- 103,118.40 T		
	X =	$	187,083.24
Boats	1030/850 (679.221.17 $\sqrt{1030/850}$)	$	906,021.83
		$	1,093,105.07
Plant Equipment and Depreciation	($55,000.00 + $2,987.00)	$	57,987.00
Boat Depreciation	$164,485.00 + (417.268.5)(.10)	$	206,211.85
Materials			
	$208,160.00 -- 19,958.4 T		
	X -- 24,748.42 T		
	X =	$	258,119.18
	$180,012.43 -- 6,652.8 T		
	Y -- 8,249.47 T		
	Y =	$	223,215.35
	X + Y =	$	481,334.53
Plant Supplies			
	$290,112.14 -- 83,160. T		
	X -- 103,118.40 T		
	X =	$	359,739.05
Boat Supplies	1030/850 (268,727.29 $\sqrt{1030/850}$)	$	358,458.78
Plant Overhead	($243,504.11 + $196.21)	$	243,700.32
Boat Overhead	1030/850 (470,339.27 $\sqrt{1030/850}$)	$	627,391.58
	$627,391.58 + [$77,868 + $15,812.28]	$	721,071.86
C. Selling and Administrative Expenses:			
Sales Expenses		$	2,450,374.28
Administrative Salaries		$	310,608.40

Table A-2. Income Statement Calculations (Continued)

	Office Equipment Depreciation	$ 1,447.93
	Other Overhead	$ 29,554.86
D.	Taxes	$ 788,453.00
	Abonos Tributarios	$ 1,238,458.00

Sixth Year

A 10% increment has been given to all the different costs with exception of Sales and Depreciation.

Taxes	$ 728,653.00
Abonos Tributarios	$ 1,238,458.00

Seventh Year

A. Net Sales:

Fish Meal	29,272.32 T	
	585.45 T x $280.00	$ 163,924.99
	28,686.87 T x $467.20	$13,402,507.35
		$13,566,432.34
Fish Oil	9,757.44 T x $480.00	$ 4,683,571.20

B. Cost of Goods Produced:

Wages and Salaries

Plant	$226,370.72 -- 103,118.4 T		
	X -- 121,968. T		
		X =	$ 267,750.31
Boats	1210/1030 (1,096,286.41 $\sqrt{1210/1030}$)		$ 1,395,874.10
			$ 1,663,624.41

Plant Equipment Depreciation $57,987.00 + $84,859.90	$ 142,846.90
Boat Depreciation $206,211.85 + $50,489.49	$ 256,761.34

Materials

$312,324.21 -- 24,748.42 T		
X -- 29,272.32 T		
	X =	$ 369,415.67

Table A-2. Income Statement Calculations (Continued)

$270,090.57	-- 8,249.47 T		
Y	-- 9,757.44 T		
	Y =		$ 319,462.05
	X + Y =		$ 688,877.72
Plant Supplies			
$435,284.25	--103,118.40 T		
X	121,968.00 T		
	X =		$ 514,852.34
Boat Supplies			
1210/1030 (433,735.12 $\sqrt{1210/1030}$)			$ 552,264.10
Plant Overhead			
$294,877.39 x 2 = $589,754.78 + $464.43			$ 590,219.21
Boat Overhead			
1210/1030 (759,143.81 $\sqrt{1210/1030}$)			$ 966,598.85
$966,598.85 + $93,680.28 + $19,132.86			$ 1,079,411.99

C. Selling and Administrative Expenses:

Sales Expense	$ 2,737,500.45
Administrative Salaries	$ 432,211.59
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 71,522.76

D. Taxes $ 788,482.00

Abonos Tributarios $ 1,464,843.00

Eighth Year

A 10% increment has been given to all the different costs with exception of Sales and Depreciation.

Taxes	$ 704,220.00
Abonos Tributarios	$ 1,464,843.00

Ninth Year

A. Net Sales:

Fish Meal	33,264.00 T		
	665.28 T x $280.00		$ 186,278.40
	32,598.72 T x $467.00		$15,230,121.98
			$15,416,400.38

Table A-2. Income Statement Calculations (Continued)

Fish Oil	11,088.00 T x $480.00	$ 5,322,240.00
B. Cost of Goods Produced:		
Wages and Salaries		
Plant	$323,977.88 -- 121,968.00 T X -- 138,600.00 T X =	$ 368,156.68
Boat	1390/1210 (1,689,007.66 $\sqrt{1390/1210}$)	$ 2,079,580.63
		$ 2,447,737.31
Plant Equipment Depreciation		$ 142,846.90
Boat Depreciation	$256,701.34 + ($610,922.81)(.10)	$ 317,793.62
Materials	$446,992.96 -- 29,272.32 T X -- 33,264.00 T X =	$ 507,946.55
	$386,549.08 -- 9,757.44 T 11,088.00 T Y =	$ 439,260.32
	X + Y =	$ 947,206.87
Plant Supplies	$622,971.33 -- 121,968. T X -- 138,600. T X =	$ 707,921.97
Boat supplies	1390/1210 (668,239.56 $\sqrt{1390/1210}$)	$ 822,765.98
Plant Overhead		$ 714,165.24
Boat Overhead	1390/1210 (1,169,584.61 $\sqrt{1390/1210}$	$ 1,440,044.09
		$ 1,576,007.99
C. Selling and Administrative Expenses:		
Sales Expense		$ 3,110,796.00
Administrative Salaries		$ 552,976.02
Office Equipment Depreciation		$ 1,447.93
Other Overhead		$ 86,542.54

Table A-2. Income Statement Calculations (Continued)

D. Taxes $ 746,698.00
Abonos Tributarios $ 1,664,594.40

Tenth Year

A. Net Sales:

Fish Meal 37,255.68 T

745.11 T x $280.00 $ 208,631.80
36,510.57 T x $467.20 $17,057,736.62
$17,266,368.43

Fish Oil 12,418.56 T x $480.00 $ 5,960,908.80

B. Cost of Goods Produced:

Wages and Salaries

Plant $404,972.35 -- 138,600 T
X -- 155,232 T
X = $ 453,569.03

Boat 1570/1390 (2,287,538.69 $\sqrt{1570/1390}$) $ 2,745,969.61
$ 3,199,538.64

Plant Equipment Depreciation $ 142,846.90

Boat Depreciation
$317,793.62 + (672,015.09)(.10) $ 384,995.13

Materials
$558,741.21 -- 33,264.00 T
X -- 37,255.68 T
X = $ 625,790.15
$483,186.35 -- 11,088.00 T
Y -- 12,418.56 T
Y = $ 541,168.71
X + Y $ 1,166,958.87

Plant Supplies
$778,714.17 -- 138,600 T
X -- 155,232 T
X = $ 872,159.87

Boat Supplies
1570/1390 (905,042.58 $\sqrt{1570/1390}$) $ 1,086,416.34

Table A-2. Income Statement Calculations (Continued)

Plant Overhead	$ 785,581.76
Boat Overhead	
1570/1390 (1,584,048.50 $\sqrt{1570/1390}$)	$ 1,901,497.47
+ 135,963.90 + 25,465.84	$ 2,062,927.21

C. Selling and Administrative Expenses:

Sales Expense	$ 3,484,091.40
Administrative Salaries	$ 575,273.62
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 95,196.79

D. Taxes $ 795,902.00
Abonos Tributarios $ 1,864,346.00

II. 10% Growth Rate
150% Decision Rule

First, second, third, and fourth year: Refer to a 100% Decision Rule.

Fifth Year

A. Net Sales:

Fish Meal	23,923.47 T	
	478.47 T x $280.00	$ 133,971.44
	23,445.00 T x $467.20	$10,953,504.28
		$11,087,475.72
Fish Oil	7,974.49 T x $480.00	$ 3,827,755.20

B. Cost of Goods Produced:

Wages and Salaries

Plant	150,873.58 -- 83,160 T		
	X -- 99,681.12 T		
	X =	$	180,874.13
Boat	1030/850 (679,221.17 $\sqrt{1030/850}$) +	$	906,021.83
	180,847.13 + 906,021.83	$	1,086,868.96
Plant Equipment Depreciation		$	55,000.00

Table A-2. Income Statement Calculations (Continued)

Boat Depreciation					$	206,211.85
Materials						
	$208,160.60	--	19,958.40 T			
	X	--	23,923.47 T			
				X =	$	249,515.19
	$180,012.43	--	6,652.80 T			
	Y	--	7,974.91 T			
				Y =	$	215,774.91
				X + Y	$	465,290.10
Plant Supplies						
	$290,112.14	--	83,160 T			
	X	--	99,681 T			
				X	$	347,747.75
Boat Supplies					$	338,458.78
Plant Overhead					$	243,504.11
Boat Overhead						
627,391.58 + (77,868) + (15,812.28)					$	721,071.86

C. Selling and Administrative Expenses:

Sales Expenses	$ 2,237,284.50
Administrative Salaries	$ 310,608.40
Office Equipment Depreciation	$ 144.80
Overhead	$ 29,554.86
D. Taxes	$ 752,934.00
Abonos Tributarios	$ 1,197,176.30

Sixth Year

A 10% increment has been given to all the different costs with exception of Sales and Depreciation.

Taxes	$ 752,934.00
Abonos Tributarios	$ 1,197,176.30

Seventh Year

A. Net Sales:

Fish Meal	28,939.68 T		
	578.79 T x $280.00	$	162,061.20

Table A-2. Income Statement Calculations (Continued)

	28,360.89 T x $467.20	$13,250,207.81
		$13,412,269.01
Fish Oil	9,646.56 T x $480.00	$ 4,630,348.80

B. Cost of Goods Produced:

Wages and Salaries

Plant	218,825.03 -- 99,681.12 T	
	X -- 120,582.00 T	
	X =	$ 264,707.69
Boat	1210/1030 (1,096,286.41 $\sqrt{1210/1030}$) +	$ 1,395,874.10
	264,707.69 + 1,395,874.10	$ 1,660,581.79

Plant Equipment Depreciation

55,000 + (36,139.84)(.10)	$ 58,613.98

Boat Depreciation

206,211.85 + (504,894.89)(.10)	$ 256,701.34

Materials

	$301,913.38 -- 23,923.47 T	
	X -- 28,939.68 T	
	X =	$ 365,217.78
	$261,087.64 -- 7,974.49 T	
	Y -- 9,646.56 T	
	Y =	$ 315,831.81
	X + Y	$ 681,049.59

Plant Supplies

	$420,774.78 -- 99,681.12 T	
	X -- 120,582.00 T	
	X =	$ 509,001.75

Boat Supplies

1210/1030 (433,735.12 $\sqrt{1210/1030}$)	$ 552,264.10

Plant Overhead	294,639.97 + 237.41	$ 294,877.38

Boat Overhead

1210/1030 (759.143.81 $\sqrt{1210/1030}$)	$ 966,598.85
+ [93,680.28 + 19,132.86]	$ 1,079,411.99

C. Selling and Administrative Expenses

Table A-2. Income Statement Calculations (Continued)

	Sales Expenses	$ 2,706,392.70
	Administrative Salaries	$ 375,836.16
	Office Equipment Depreciation	$ 144.80
	Overhead	$ 35,761.38
D.	Taxes	$ 822,038.00
	Abonos Tributarios	$ 1,448,197.22

Eighth Year

A 10% increment has been given to all the different costs with exception of Sales and Depreciation.

Taxes	$ 742,092.00
Abonos Tributarios	$ 1,448,197.22

Ninth Year

A. Net Sales:

Fish Meal	32,731.78 T	
	654.64 T x $280.00	$ 183,299.20
	32,077.14 T x $467.20	$14,986,441.86
		$15,169,741.06
Fish Oil	10,910.59 T x $480.00	$ 5,237,083.20

B. Cost of Goods Produced:

Wages and Salaries

Plant	320,296.30 -- 120,582.00 T	
	X -- 136,382.40 T	
	X =	$ 362,266.17
Boat 1390/1210	(1,689,077.66 $\sqrt{1390/1210}$)	$ 2,079,580.63
		$ 2,441,846.80
Plant Equipment Depreciation		$ 58,613.98
Boat Depreciation		
256,701.34 + (610,922.81)(.10)		$ 317,793.62
Materials	$441,913.51 -- 23,939.68 T	
	X -- 32,731.78 T	
	X =	$ 499,819.48

Table A-2. Income Statement Calculations (Continued)

$382,156.49	--	9,646.56	T		
Y	--	10,910.59	T		
			Y =	$	432,232.09
			X + Y =	$	932,051.57

Plant Supplies

$615,892.12	--	120,582.00	T		
X	--	136,382.40	T		
			X =	$	696,595.23

Boat Supplies

1390/1210 (668,239.56 $\sqrt{1390/1210}$) $ 822,765.98

Plant Overhead $ 356,801.63

Boat Overhead

1390/1210 (1,169,584.61 $\sqrt{1390/1210}$) $ 1,440,044.09

\+ [112,813.14 + 23,150.76] $ 1,576,007.99

C. Selling and Administrative Expenses:

Sales Expenses	$ 3,061,023.60
Administrative Salaries	$ 454,761.75
Office Equipment Depreciation	$ 1,448.00
Overhead	$ 43,271.23

D. Taxes $ 780,557.00

Abonos Tributarios $ 1,637,961.00

Tenth Year

A. Net Sales:

Fish Meal	35,925.12 T		
	718.50 T x $280.00	$	201,180.67
	35,206.62 T x $467.20	$	16,448,531.74
		$	16,649,712.41
Fish Oil	11,975.04 T x $480.00	$	5,748,019.20

B. Cost of Goods Produced:

Wages and Salaries

Plant	398,492.79	--	136,382.40	T	
	X	--	149,688.00	T	
				X =	$ 437,370.13

Table A-2. Income Statement Calculations (Continued)

Boat	1570/1390 (2,287,538.69 $\sqrt{1570/1390}$) +	$ 2,745,969.61
	473,370.13 + 2,745.00	$ 3,183,339.75
Plant Equipment Depreciation		$ 58,613.98
Boat Depreciation		
	317,793.62 + (672,015.09)(.10)	$ 384,995.13
Materials	$549,801.43 -- 32,731.78 T	
	X -- 35,925.12 T	
	X =	$ 603,440.52
	$475,455.30 -- 10,910.59 T	
	Y -- 11,975.04 T	
	Y =	$ 521,841.28
	X + Y =	$ 1,125,281.80
Plant Supplies		
	$766,254.75 -- 136,382.40 T	
	X -- 149,688.00 T	
	X =	$ 841,011.31
Boat Supplies		
	1570/1390 (905,042.58 $\sqrt{1570/1390}$)	$ 1,086,416.34
Plant Overhead		$ 392,481.79
Boat Overhead		
	1570/1390 (1,584,048.50 $\sqrt{1570/1390}$)	$ 1,901,497.47
	+ [135,963.90 + 25,465.84]	$ 2,062,927.21
C. Selling and Administrative Expenses:		
Sales Expenses		$ 3,359,659.65
Administrative Salaries		$ 500,237.93
Office Equipment Depreciation		$ 1,448.00
Overhead		$ 47,598.35
D. Taxes		$ 732,195.00
Abonos Tributarios		$ 1,797,762.00

III. 15% Growth Rate
100% Decision Rule

First Year

Refer to 10% Growth Rate, 100% Decision Rule

Table A-2. Income Statement Calculations (Continued)

Second Year

A. Net Sales:

Fish Meal	19,958.4 T		
	399.17 T x $280.00		$ 111,767.04
	19,559.23 T x $467.20		$ 9,138,073.19
			$ 9,249,840.23
Fish Oil	6,652.8 T x $480.00		$ 3,193,344.00

B. Cost of Goods Produced:

Wages and Salaries

Plant	92,194.22 -- 67,636.8 T		
	X -- 83,160.0 T		
	X =		$ 113,353.55
Boat	850/670 (357,122.3 $\sqrt{850.670}$)		$ 510,308.91
			$ 623,662.46
Plant Equipment Depreciation			$ 55,000.00
Boat Depreciation			
	130,000.00 + (313,500.00)(.10)		$ 161,350.00
Materials	$127,200.55 -- 16,232.83 T		
	X -- 19,958.40 T		
	X =		$ 156,394.13
	$110,000.00 -- 5,410.94 T		
	Y -- 6,652.8 T		
	Y =		$ 135,246.00
	X + Y =		$ 291,640.13
Plant Supplies			
	$177,278.64 -- 67,636.8 T		
	X -- 83,160.0 T		
	X =		$ 217,965.54
Boat Supplies			
	850/670 (141,291.99 $\sqrt{850/670}$)		$ 201,898.79
Plant Overhead			$ 182,959.78
Boat Overhead			
	850/670 (247,296.50 $\sqrt{850/670}$)		$ 353,373.64
	+ [64,800.00 + 11,880.00]		$ 430,053.64

Table A-2. Income Statement Calculations (Continued)

C. Selling and Administrative Expenses:

Sales Expenses	$ 1,866,477.64
Administrative Salaries	$ 233,364.68
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 22,204.60

D. Taxes $ 706,042.00
Abonos Tributarios $ 998,757.00

Third Year

A. Net Sales:

Fish Meal 24,748.42 T

494.97 T x $280.00 $ 138,591.15
24,253.45 T x $467.20 $11,331,212.59
$11,469,803.74

Fish Oil 8,249.47 T x $480.00 $ 3,959,745.60

B. Cost of Goods Produced:

Wages and Salaries

Plant $124,688.91 -- 83,160.00 T
X -- 103,118.40 T
X = $ 154,614.24

Boat 1030/850 (561,339.80 $\sqrt{1030/850}$) $ 748,778.36
$ 903,392.60

Plant Equipment Depreciation
$55,000.00 + (24,684.00)(.10) $ 57,468.40

Boat Depreciation
$161,350.00 + (344,850.00)(.10) $ 195,835.00

Materials $172,033.54 -- 19,958.4 T
X -- 27,748.42 T
X = $ 213,321.63
$148,770.60 -- 6,652.8 T
Y -- 8,249.47 T
Y = $ 184,475.50
X + Y = $ 397,797.13

Plant Supplies $239,762.09 -- 83,160.00 T
X -- 103,118.40 T

Table A-2. Income Statement Calculations (Continued)

		X =	$ 297,305.00
Boat Supplies			
	1390/850 (222,088.67 $\sqrt{1030/850}$)		$ 296,246.92
Plant Overhead	$201,255.75 + $179.00		$ 201,434.75
Boat Overhead			
	1030/850 (388,711.00 $\sqrt{1030/850}$)		$ 518,506.59
	+ [76,680.00 + 13,068.00]		$ 608,254.59
C. Selling and Administrative Expenses:			
Sales Expenses			$ 2,314,433.00
Administrative Salaries			$ 256,701.15
Office Equipment Depreciation			$ 1,447.93
Other Overhead			$ 24,425.06
D. Taxes			$ 851,460.00
Abonos Tributarios			$ 1,238,458.00

Fourth Year

A 10% increment has been given to all the different costs with exception of Sales and Depreciation.

Taxes	$ 797,851.00
Abonos Tributarios	$ 1,238,458.00

Fifth Year

A. Net Sales:			
Fish Meal	28,272.32 T		
	585.45 T x $280.00		$ 163,924.99
	28,686.87 T x $467.20		$13,402,507.35
			$13,566,432.34
Fish Oil	9,757.44 T x $480.00		$ 4,683,571.20
B. Cost of Goods Produced:			
Wages and Salaries			
Plant	$187,083.23 -- 103,118.40 T		
	X -- 121,968.00 T		
		X =	$ 1,153,614.94

Table A-2. Income Statement Calculations (Continued)

Boat	1210/1030 (906,021.82 $\sqrt{1210/1030}$)		$ 221,281.24
Plant Equipment Depreciation	$57,468.40 + (701,321.47)(.10)		$ 127,600.55
Boat Depreciation	$195,835.00 + (417,268.50)(.10)		$ 237,561.85
Materials	$258,119.17 -- 24,748.42 T		
	X -- 29,272.32 T		
		X =	$ 305,302.19
	$223,215.36 -- 8,249.47 T		
	Y -- 9,757.44 T		
		X + Y	$ 569,320.42
Plant Supplies	$359,739.05 -- 103,118.40 T		
	X -- 121,968.00 T		
		X =	$ 425,497.80
Boat Supplies	1210/1030 (358,458.77 $\sqrt{1210/1030}$)		$ 456,416.60
Plant Overhead	$243,736.05 x 2		$ 487,472.10
	+ $383.83		$ 487,855.93
Boat Overhead	1210/1030 (627,392.97 $\sqrt{1210/1030}$)		$ 798,843.80
	+ [80,748.00 + 15,812.28]		$ 904,404.08

C. Selling and Administrative Expenses

Sales Expenses	$ 2,737,500.48
Administrative Salaries	
$310,608.39 + .15(310,608.39)	$ 357,199.65
Office Equipment Depreciation	$ 1,447.93
Other Overhead	
$29,554.32 x 2	$ 59,108.65

D. Taxes	$ 888,891.00
Abonos Tributarios	$ 1,464,843.00

Sixth Year

A. Net Sales:

Fish Meal	33,264.00 T	
	665.28 T x $280.00	$ 186,278.40

Table A-2. Income Statement Calculations (Continued)

	32,598.72 T x $467.20		$15,230,121.98
			$15,416,400.38
Fish Oil	11,088.00 T x $467.20		$ 5,322,240.00

B. Cost of Goods Produced:

Wages and Salaries

Plant	$243,409.36 -- 121,968.00 T		
	X -- 138,600.00 T		
	X =	$	276,601.55
Boat	$1390/1210\ (1{,}268{,}976.43\ \sqrt{1390/1210})$		$ 1,562,419.69
			$ 1,839,021.24
Plant Equipment Depreciation		$	127,600.55
Boat Depreciation			
	$237,561.85 + (458,995.35)(.10)	$	283,461.39
Materials	$335,832.41 -- 29,272.32 T		
	X -- 33,264.00 T		
	X =	$	381,627.74
	$290,420.05 -- 9,757.44 T		
	Y -- 11,088.00 T		
	Y =	$	330,022.79
	X + Y =	$	711,650.53
Plant Supplies			
	$468,047.58 -- 121,968.00 T		
	X -- 138,600.00 T		
	X =	$	531,872.25
Boat Supplies			
	$1390/1210\ (502{,}058.26\ \sqrt{1390/1210})$	$	618,156.25
Plant Overhead		$	536,641.52
Boat Overhead			
	$1390/1210\ (878{,}728.18\ \sqrt{1390/1210})$	$	1,081,928.84
	+ [105,560.28 + 17,393.51]	$	1,204,882.63

C. Selling and Administrative Expenses

Sales Expenses	$ 3,110,796.06
Administrative Salaries	$ 392,919.62
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 65,019.52

Table A-2. Income Statement Calculations (Continued)

D. Taxes $ 946,443.00
Abonos Tributarios $ 1,664,594.43

Seventh Year

A. Net Sales:

Fish Meal 37,255.68 T

745.11 T x $280.00 $ 208,630.80
36,510.57 T x $467.20 $17,057,738.30
$17,266,369.10

Fish Oil 12,418.56 T x $480.00 $ 5,960,909.00

B. Cost of Goods Produced:

Wages and Salaries

Plant $304,261.71 -- 138,600 T
X -- 155,232 T
X = $ 340,773.11

Boat 1570/1390 (1,718,661.66 $\sqrt{1570/1390}$) $ 2,063,087.59
$ 2,403,860.70

Plant Equipment Depreciation $ 127,600.55

Boat Depreciation
$283,461.39 + (504,894.89)(.10) $ 333,950.88

Materials $419,790.51 -- 33,264.00 T
X -- 37,255.68 T
X = $ 470,165.38
$363,025.07 -- 11,088.00 T
Y -- 12,418.56 T
Y = $ 406,588.08
X + Y = $ 876,753.46

Plant Supplies
$585,059.48 -- 138,600.00 T
X -- 155,232.00 T
X = $ 655,266.61

Boat Supplies
1570/1390 (679,971.88 $\sqrt{1570/1390}$) $ 816,240.67

Plant Overhead $ 590,305.67

Table A-2. Income Statement Calculations (Continued)

Boat Overhead		
1570/1390 (1.190,121.72 $\sqrt{1570/1390}$)		$ 1,428,626.37
+ [122,953.79 + 19,132.86]		$ 1,570,713.02
C. Selling and Administrative Expenses:		
Sales Expenses		$ 3,484,091.59
Administrative Salaries		$ 432,211.58
Office Equipment Depreciation		$ 1,447.93
Other Overhead		$ 71,521.47
D. Taxes		$ 978,117.00
Abonos Tributarios		$ 1,864,345.76

Eighth Year

A. Net Sales:			
Fish Meal	42,511.39 T		
	850.23 T x $280.00		$ 238,063.78
	41,661.16 T x $467.20		$19,464,094.98
			$19,702,158.76
Fish Oil	14,170.46 T x $480.00		$ 6,801,820.80
B. Cost of Goods Produced:			
Wages and Salaries			
Plant	$374,850.42 -- 155,232.00 T		
	X -- 177,130.8 T		
	X =		$ 427,731.11
Boat	1750/1570 (2,269,396.35 $\sqrt{1750/1570}$)		$ 2,670,655.97
			$ 3,098,387.08
Plant Equipment Depreciation			$ 127,600.55
Boat Depreciation			
$333,950.88 + (555,384.37)(.10)			$ 389,489.32
Materials	$517,181.92 -- 37,255.68 T		
	X -- 42,511.39 T		
	X =		$ 590,141.48
	$447,246.89 -- 12,418.56 T		
	Y -- 14,170.46 T		
	Y =		$ 510,340.50
	X + Y =		$ 1,100,481.98

Table A-2. Income Statement Calculations (Continued)

Plant Supplies

$720,793.27 -- 155,232.00 T
X -- 177,130.80 T
X = $ 822,476.61

Boat Supplies

1750/1570 (897,864.74 $\sqrt{1750/1570}$) $ 1,056,619.23

Plant Overhead $ 649,336.24

Boat Overhead

1750/1570 (1,571,489.01 $\sqrt{1750/1570}$) $ 1,849,349.28
+ [142,086.65 + 21,046.15] $ 2,012,482.08

C. Selling and Administrative Expenses:

Sales Expenses	$ 3,975,596.93
Administrative Salaries	$ 475,432.74
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 78,673.62

D. Taxes $ 1,033,064.00
Abonos Tributarios $ 2,127,351.40

Ninth Year

A. Net Sales:

Fish Meal	50,029.06 T	
	1,000.58 T x $280.00	$ 280,162.71
	49,028.48 T x $467.20	$22,906,103.46
		$23,186,266.17
Fish Oil	16,676.35 T x $480.00	$ 8,004,648.00

B. Cost of Goods Produced:

Wages and Salaries

Plant $470,504.22 -- 177,130.8 T
X -- 208,454.4 T
X = $ 553,707.63

Boat 2110/1750 (2,937,721.57 $\sqrt{2110/1750}$) $ 3,889,351.92
$ 4,443,059.55

Plant Equipment Depreciation

$127,600.55 + (43,729.21)(.10) $ 131,973.47

Table A-2. Income Statement Calculations (Continued)

Boat Depreciation			
$389,489.32 + (610,922.81)(.10)(2)			$ 511,673.88
Materials	$649,155.63 -- 42,511.39 T		
	X -- 50,029.06 T		
		X =	$ 763,951.63
	$561,374.55 -- 14,170.46 T		
	Y -- 16,676.35 T		
		Y =	$ 660,647.47
		X + Y =	$ 1,424,599.10
Plant Supplies			
	$904,724.27 -- 177,130.8 T		
	X -- 208,454.4 T		
		X =	$ 1,064,714.64
Boat Supplies			
2110/1750 (1,162,281.15 $\sqrt{2110/1750}$)			$ 1,538,784.51
Plant Overhead	$714,269.86 + 240.00		$ 714,509.86
Boat Overhead			
2110/1750 (2.034,284.21 $\sqrt{2110/1750}$)			$ 2,693,259.73
+ [163,132.80 + 2(23,150.77)]			$ 2,902,694.06

C. Selling and Administrative Expenses:

Sales Expenses	$ 4,678,637.13
Administrative Salaries	$ 522,976.01
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 86,540.98

D. Taxes $ 1,034,152.00
Abonos Tributarios $ 2,503,549.91

Tenth Year

A. Net Sales:

Fish Meal	55,351.3 T	
	1,107.03 T x $280.00	$ 309,967.28
	54,244.27 T x $467.20	$25,342,922.94
		$25,652,890.22
Fish Oil	18,450.43 T x $480.00	$ 8,856,206.40

B. Cost of Goods Produced:

Table A-2. Income Statement Calculations (Continued)

Wages and Salaries			
Plant	$609,078.39 -- 208,454.4 T		
	X -- 230,630.4 T		
		X = $	673,873.97
Boat	2290/2110 (4,278,287.11 $\sqrt{2290/2210}$)		$ 4,837,260.40
			$ 5,511,134.37
Plant Equipment Depreciation			$ 131,973.47
Boat Depreciation			
	$511,673.88 + (672,015.09)(.10)		$ 578,875.39
Materials	$840,346.79 -- 50,029.06 T		
	X -- 55,351.3 T		
		X = $	929,745.38
	$726,712.22 -- 16,676.35 T		
	Y -- 18,450.43 T		
		Y = $	730,929.12
		X + Y = $	1,660,674.51
Plant Supplies			
	$1,171,186.10 -- 208,454.4 T		
	X -- 230,630.4 T		
		X = $	1,295,780.37
Boat Supplies			
	2290/2110 (1,692,662.96 $\sqrt{2290/2110}$)		$ 1,913,815.34
Plant Overhead			$ 785,960.85
Boat Overhead			
	2290/2110 (2,962,585.7 $\sqrt{2290/2110}$)		$ 3,349,657.96
	+ [209,434.34 + 25,465.85]		$ 3,584,448.15
C. Selling and Administrative Expenses:			
Sales Expenses			$ 5,176,364.49
Administrative Salaries			$ 575,273.61
Office Equipment Depreciation			$ 1,447.93
Other Overhead			$ 95,195.08
D. Taxes			$ 1,005,366.00
Abonos Tributarios			$ 2,769,885.00

Table A-2. Income Statement Calculations (Continued)

IV. 15% Growth Rate
150% Decision Rule

First and Second Year

Refer to a 100% Decision Rule

Third Year

A. Net Sales:

Fish Meal	23,923.47 T		
	478.47 T x $280.00		$ 133,971.43
	23,445.00 T x $467.20		$10,953,504.28
			$11,087,475.71
Fish Oil	7,974.49 T x $480.00		$ 3,827,755.20

B. Cost of Goods Produced:

Wages and Salaries

Plant	$124,688.91 -- 83,160.00 T		
	X -- 99,681.12 T		
	X =	$	149,460.43
Boat	1030/850 (561,399.80 $\sqrt{1030/850}$)	$	748,778.36
		$	898,238.79
Plant Equipment Depreciation		$	55,000.00
Boat Depreciation			
$161,350 + (344,850.00)(.10)		$	195,835.00
Materials	$172,033.54 -- 19,958.40 T		
	X -- 23,923.47 T		
	X =	$	206,210.88
	$148,770.60 -- 6,652.80 T		
	Y -- 7,974.49 T		
	Y =	$	178,326.37
	X + Y	$	384,537.25
Plant Supplies			
	$239,762.09 -- 83,160.00 T		
	X -- 99,681.12 T		
	X =	$	287,394.83

Table A-2. Income Statement Calculations (Continued)

Boat Supplies		
1030/850 (222,088.67 $\sqrt{1030/850}$)		$ 296,246.92
Plant Overhead		$ 201,255.76
Boat Overhead		
1030/850 (388,711.00 $\sqrt{1030/850}$)		$ 518,506.59
+ [76,680 + 13,068]		$ 608,254.59
C. Selling and Administrative Expenses:		
Sales Expenses		$ 2,237,284.64
Administrative Salaries		$ 256,701.15
Office Equipment Depreciation		$ 1,447.93
Overhead		$ 24,425.06
D. Taxes		$ 815,286.00
Abonos Tributarios		$ 1,197,176.37

Fourth Year

A 10% increment has been given to all costs with exception of Sales and Depreciation.

Taxes	$ 762,745.00
Abonos Tributarios	$ 1,197,176.00

Fifth Year

A. Net Sales:

Fish Meal	28,939.68 T	
	578.59 T x $280.00	$ 162,062.21
	28,360.89 T x $467.20	$13,250,206.13
		$13,412,268.34
Fish Oil	9,646.56 T x $480.00	$ 4,630,348.80

B. Cost of Goods Produced:

Wages and Salaries

Plant	$180,847.12 -- 99,681.12 T	
	X -- 120,582.00 T	
	X =	$ 218,766.68
Boat	1210/1030 (906,021.82 $\sqrt{1210/1030}$)	$ 1,153,614.94
	+ 218,766.68	$ 1,372,381.62

Table A-2. Income Statement Calculations (Continued)

Plant Equipment Depreciation			
$55,000 + (29,867.64)(.10)			$ 57,986.76
Boat Depreciation			
$195,835 + (417,268.50)(.10)			$ 237,561.85
Materials	$249,515.16 -- 23,923.47 T		
	X -- 28,939.68 T		
	X	=	$ 301,832.85
	$215,774.91 -- 7,974.49 T		
	Y -- 9,646.56 T		
	Y	=	$ 261,018.02
	X + Y	=	$ 562,850.87
Plant Supplies			
	$347,747.74 -- 99,681.12		
	X -- 120,582.00		
	X	=	$ 420,662.59
Boat Supplies			
1210/1030 (358,458.77 $\sqrt{1210/1030}$)			$ 456,416.60
Plant Overhead $243,519.47 + $19,621.00			$ 243,700.32
Boat Overhead			
1210/1030 (627,392.97 $\sqrt{1210/1030}$)			$ 798,843.80
+ [89,748.00 + 15,812.28]			$ 904,404.08

C. Selling and Administrative Expenses:

Sales Expenses	$ 2,706,392.57
Administrative Salaries	$ 310,608.39
Office Equipment Depreciation	$ 1,447.93
Overhead	$ 29,554.32

D. Taxes $ 993,879.00

Abonos Tributarios $ 1,448,197.15

Sixth Year

A. Net Sales:

Fish Meal	32,731.78 T	
	654.64 T x $280.00	$ 183,297.97
	32,077.14 T x $467.20	$14,986,441.86
		$15,169,739.83
Fish Oil	10,910.59 T x $480.00	$ 5,237,083.20

Table A-2. Income Statement Calculations (Continued)

B.	Cost of Goods Produced:		
	Wages and Salaries		
	Plant	$240,643.35 -- 120,582.00 T	
		X -- 136,382.40 T	
		X =	$ 272,175.92
	Boat 1390/1210 (1,268,976.43 $\sqrt{1390/1210}$)		$ 1,562,419.69
			$ 1,834,595.61
	Plant Equipment Depreciation		$ 57,986.76
	Boat Depreciation		
	$237,175.92 + (458,995.35)(.10)		$ 283,461.39
	Materials	$332,016.14 -- 28,939.68 T	
		X -- 32,731.78 T	
		X =	$ 375,521.74
		$287,119.82 -- 9,646.56 T	
		Y -- 10,910.59 T	
		Y =	$ 324,742.36
		X + Y =	$ 700,264.10
	Plant Supplies		
		$462,728.85 -- 120,582.00 T	
		X -- 136,382.40 T	
		X =	$ 523,362.28
	Boat Supplies		
	1390/1210 (502,058.26 $\sqrt{1390/1210}$)		$ 618,156.25
	Plant Overhead		$ 268,070.35
	Boat Overhead		
	1390/1210 (878,728.18 $\sqrt{1390/1210}$)		$ 1,081,928.84
	+ [105,560.28 + 17,393.51]		$ 1,204,882.63
C.	Selling and Administrative Expenses:		
	Sales Expenses:		$ 3,061,023.46
	Administrative Salaries		$ 341,669.23
	Office Equipment Depreciation		$ 1,447.93
	Overhead		$ 32,509.75
D.	Taxes		$ 966,223.00
	Abonos Tributarios		$ 1,637,960.94

Table A-2. Income Statement Calculations (Continued)

Seventh Year

A. Net Sales:

Fish Meal	35,925.12 T		
	718.50 T x $280.00		$ 201,180.67
	35,206.62 T x $467.20		$16,448,531.74
			$16,649,712.41
Fish Oil	11,975.04 T x $480.00		$ 5,748,019.20

B. Cost of Goods Produced:

Wages and Salaries			
Plant	$299,393.51 -- 136,382.40 T		
	X -- 149,688.00 T		
		X =	$ 328,602.64
Boat	1570/1390 (1,718,661.66 $\sqrt{1570/1390}$)		$ 2,063,087.59
			$ 2,391,690.23
Plant Equipment Depreciation			$ 57,986.76
Boat Depreciation			
	$283,461.39 + (504,894.89)(.10)		$ 333,950.88
Materials	$413,073.91 -- 32,731.78 T		
	X -- 35,925.12 T		
		X =	$ 453,373.75
	$357,216.60 -- 10,910.59 T		
	Y -- 11,975.01 T		
		Y =	$ 392,067.07
		X + Y =	$ 845,440.82
Plant Supplies			
	$575,698.51 -- 136,382.40 T		
	X -- 149,688.00 T		
		X =	$ 631,864.22
Boat Supplies			
	1570/1390 (679,971.88 $\sqrt{1570/1390}$)		$ 816,240.67
Plant Overhead			$ 294,877.39
Boat Overhead			
	1570/1390 (1,190,121.72 $\sqrt{1570/1390}$)		$ 1,428,626.37
	+ [122,953.79 + 19,132.86]		$ 1,570,713.02

Table A-2. Income Statement Calculations (Continued)

C. Selling and Administrative Expenses:

Sales Expenses	$ 3,359,659.74
Administrative Salaries	$ 375,836.15
Office Equipment Depreciation	$ 1,447.93
Overhead	$ 35,760.73

D. Taxes $ 967,727.00

Abonos Tributarios $ 1,797,761.98

Eighth Year

A. Net Sales:

Fish Meal 42,511.39 T

850,23 T x $280.00 $ 238,063.78

41,661.16 T x $467.20 $19,464,094.98

$19,702,158.76

Fish Oil 14,170.46 T x $480.00 $ 6,801,820.80

B. Cost of Goods Produced:

Wages and Salaries

Plant $361,462.90 -- 149,688.00 T

X -- 177,130.80 T

X = $ 427,731.10

Boat $1750/1570\ (2,269,396.35\ \sqrt{1750/1570})$ $ 2,670,655.97

$ 3,098,387.07

Plant Equipment Depreciation

$57,986.76 + (933,458.88)(.10) $ 151,332.65

Boat Depreciation

$330,950.88 + (555,384.37)(.10) $ 389,489.32

Materials $498,711.13 -- 35,925.12 T

X -- 42,511.39 T

X = $ 590,141.47

$431,273.78 -- 11,975.04 T

Y -- 14,170.46 T

Y = $ 510,340.49

X + Y = $ 1,100,481.96

Plant Supplies

$695,050.64 -- 149,688.00 T

Table A-2. Income Statement Calculations (Continued)

	X -- 177,130.80 T X =	$ 822,476.59
Boat Supplies 1750/1570 (897,864.74 $\sqrt{1750/1570}$)		$ 1,056,619.23
Plant Overhead (2)(324,365.13) + 510.88		$ 649,241.14
Boat Overhead 1750/1570 (1,571,489.01 $\sqrt{1750/1570}$) + [142,086.65 + 21,046.15]		$ 1,849,349.28 $ 2,012,482.08
C. Selling and Administrative Expenses:		
Sales Expenses		$ 3,975,596.93
Administrative Salaries $413,419.77 + (15%)		$ 475,432.23
Office Equipment Depreciation		$ 1,447.93
Other Overhead ($39,336.80)(2)		$ 78,673.61
D. Taxes		$ 1,030,673.00
Abonos Tributarios		$ 2,127,351.40

Ninth Year

A. Net Sales:		
Fish Meal 49,896.00 T		
997.92 T x $280.00		$ 279,417.60
48,898.08 T x $467.20		$22,845,182.98
		$23,124,600.58
Fish Oil 16,632.00 T x $480.00		$ 7,983,360.00
B. Cost of Goods Produced:		
Wages and Salaries		
Plants $479,504.21 -- 177,130.80 T X -- 207,900.00 T X =		$ 552,234.99
Boat 2110/1750 (2,937,721.57 $\sqrt{2110/1750}$)		$ 3,889,351.92
		$ 4,441,586.91
Plant Equipment Depreciation		$ 151,332.65

Table A-2. Income Statement Calculations (Continued)

Boat Depreciation			
$389,489.32 + (610,922.81)(.10)			$ 511,673.88
Materials	$649,155.62 -- 42,511,39 T		
	X -- 49,896.00 T		
		X =	$ 761,919.77
	$561,374.34 -- 14,170.46 T		
	Y -- 16,632.00 T		
		Y =	$ 658,890.49
		X + Y =	$ 1,420,810.26
Plant Supplies			
	$904,724.25 -- 177,130.80 T		
	X -- 207,900.00 T		
		X =	$ 1,061,882.92
Boat Supplies			
2110/1750 (1,162,281.15 $\sqrt{2110/1750}$)			$ 1,538,784.51
Plant Overhead			$ 714,165.25
Boat Overhead			
2110/1750 (2,034,284.21 $\sqrt{2110/1750}$)			$ 2,693,259.73
+ [163,132.8 + (2)(23,150.77)]			$ 2,902,694.06

C. Selling and Administrative Expenses:

Sales Expenses	$ 4,666,194.00
Administrative Salaries	$ 522,976.00
Office Equipment Depreciation	$ 1,447.93
Other Overhead	$ 86,540.97

D. Taxes $ 1,026,708.00
Abonos Tributarios $ 2,496,892.00

Tenth Year

A. Net Sales:

Fish Meal	57,214.08 T		
	1,444.28 T x $280.00		$ 320,398.85
	56,069.80 T x $467.20		$26,195,809.81
			$26,516,208.66
Fish Oil	19,071.36 T x $480.00		$ 9,154,252.80

B. Cost of Goods Produced:

Table A-2. Income Statement Calculations (Continued)

Wages and Salaries			
Plant	$607,458.49 -- 207,900.00 T		
	X -- 238,392.00 T		
	X =	$	696,552.40
Boat	2470/2110 (4,278,287.00 $\sqrt{2470/2110}$)	$	5,418,657.15
		$	6,115,209.55
Plant Equipment Depreciation		$	151,332.65
Boat Depreciation			
	$511,673.88 + (672,015.09)(.10)	$	646,076.90
Materials	$838,111.75 -- 49,896.00 T		
	X -- 57,214.08 T		
	X =	$	961,034.80
	$724,779.54 -- 16,632.00 T		
	Y -- 19,071.36 T		
	Y =	$	831,080.54
	X + Y =	$	1,792,115.34
Plant Supplies			
	$1,168,071.21 -- 207,900.00 T		
	X -- 238,392.00 T		
	X =	$	1,339,388.32
Boat Supplies			
	2470/2110 (1,692,662.96 $\sqrt{2470/2110}$)	$	2,143,839.35
Plant Overhead		$	785,581.78
Boat Overhead			
	2470/2110 (2,962,585.70 $\sqrt{2470/2110}$)	$	3,752,257.81
	+ [209,434.34 + (2)(25,465.850]	$	4,012,623.84
C. Selling and Administrative Expenses:			
Sales Expenses		$	5,350,569.22
Administrative Salaries		$	575,273.60
Office Equipment Depreciation		$	1,447.93
Other Overhead		$	95,195.07
D. Taxes		$	940,033.00
Abonos Tributarios		$	2,863,102.41

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